TECHNOLOGY DEPT.

INDIA RUBBER WORLD

OUR

63rd YEAR

A BILL BROTHERS PUBLICATION

APRIL, 1952

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DETROIT

Announcing a **NEW**

CABOT OIL FURNACE BLACK

Gives Superior Abrasion Resistance
Higher Tensile Strength

Vulcan-6

Gives 20% Better Tire Mileage than Standard HAF Blacks

Proved by Extensive Cabot Road Tests
Can Be Substituted Directly for HAF

GODFREY L. CABOT, INC.
77 FRANKLIN STREET, BOSTON 10, MASS.

for balanced properties

NEOPRENE Type WRT

The new all-purpose neoprene

Here are the advantages you'll get with Neoprene Type WRT:

IN YOUR PLANT Look at Neoprene Type WRT from the standpoint of processing. It handles well on the mill, acting in much the same fashion as Type W. In storage, too, Type WRT is very stable and doesn't undergo changes characteristic of other general-purpose neoprenes. Furthermore, Type WRT resists stiffening in the uncured state. Stocks retain tack; building operations proceed smoothly.

IN YOUR PRODUCT Neoprene Type WRT has excellent set over a wide range of temperatures. At -50°F., it is better than any of the other neoprenes or natural rubber. At 300°F., set is still outstanding. Type WRT compounds are also remarkably free from crystallization in the cured state.

To these plus values, add oil and chemical resistance, resistance to sunlight and weathering, resistance to ozone and oxidation, and excellent aging—characteristics for which the neoprenes are so well known. You'll agree that Neoprene Type WRT *is* an all-purpose polymer.

Why not prove to yourself that Neoprene Type WRT can give you special benefits in your plant—in your product? We'll be glad to send samples. For more complete information, consult Report No. 52-1. If you'd like another copy, call your Du Pont representative or write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div., Wilmington 98, Delaware.

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Akron, Ohio	40 E. Buchtel Ave,	HEmlock 3161
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DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

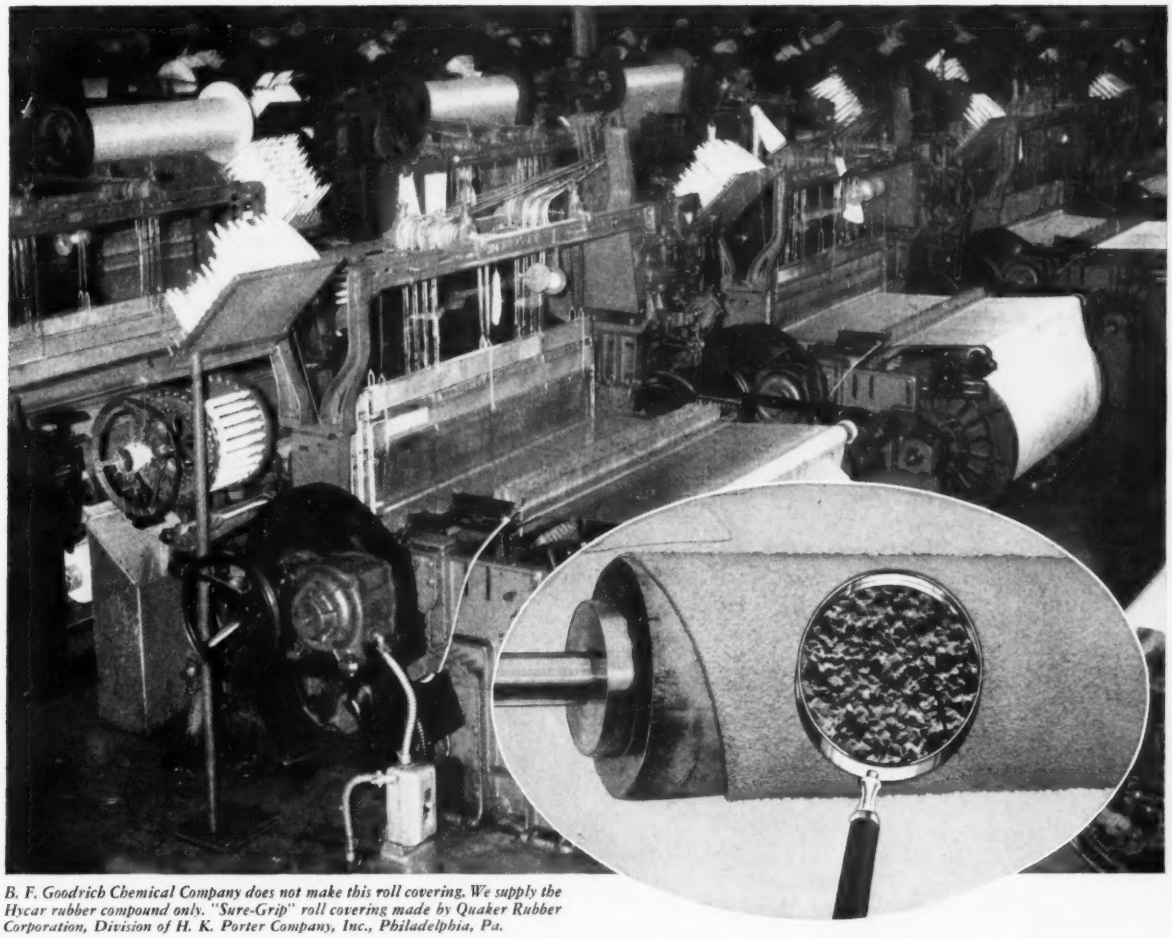
150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

INDIA RUBBER WORLD, April, 1952, Vol. 126, No. 1. Published Monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, Orange Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription United States and Mexico, $5.00 per year, Canada $6.00. All Other Countries $7.00; Single copies 50 Cents. Address Mail to N.Y. Office.

Another development using

B. F. Goodrich Chemical Company *raw materials*



B. F. Goodrich Chemical Company does not make this roll covering. We supply the Hycar rubber compound only. "Sure-Grip" roll covering made by Quaker Rubber Corporation, Division of H. K. Porter Company, Inc., Philadelphia, Pa.

RUBBER SANDPAPER THAT WON'T HARM FINE FABRICS!

IN processing synthetic textiles, some sizing oils attack the rubber covering on take-up rolls and stop production. To overcome this time-and-money loss, a rubber products manufacturer investigated Hycar rubber compounds. See what he found!

First, exactly the kind of superior oil-resistant rubber to do the job. And—the Hycar compound processes much easier than compounds used previously . . . has better abrasion resistance which makes for longer-lived roll coverings.

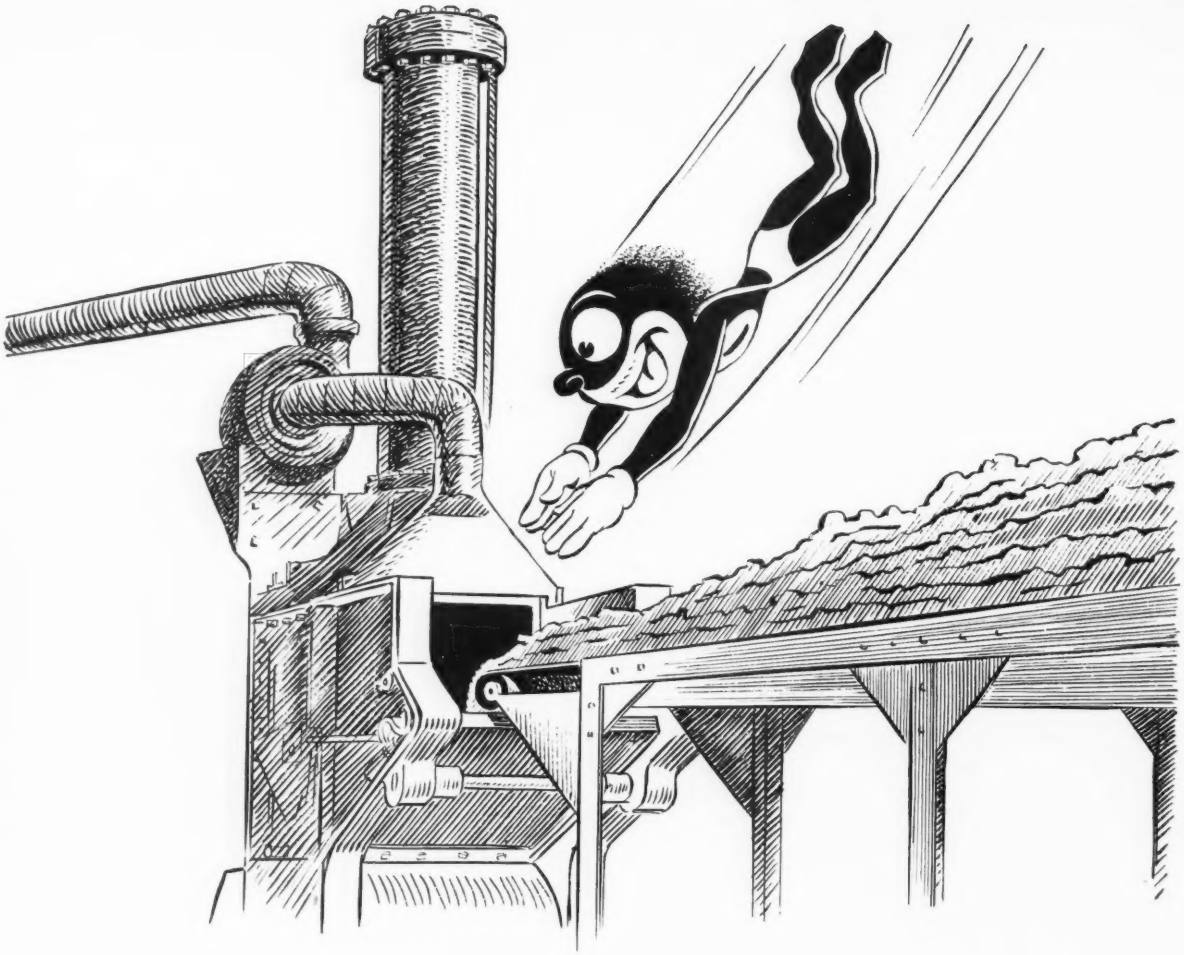
What Hycar does here is typical of the many ways it helps make important savings and do a *better* job. For Hycar rubber compounds have many advantages—resistance to heat and cold, gas, oil, many chemicals, abrasion and more damaging factors. One of the many Hycar rubber compounds may be just what you need to improve or develop a product. Technical assistance and bulletins are yours for the asking. Write Dept. HB-2. B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Need extreme temperature resistance? Hycar has it—plus abrasion resistance and more advantages.

Hycar
Reg. U. S. Pat. Off.
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers
HARMON organic colors



For long flex life use this elixir
Put **Philblack*** **O** *in your Banbury Mixer!*

Old tires never die, they hardly wear away! That's right . . . when toughened with Philblack O the mortality rate goes down, down, *down* . . . and life expectancy goes up, up, *up!* That's because Philblack O imparts really remarkable flex life, excellent aging qualities, and exceptional abrasion resistance. Helps dissipate static electricity, too.

Combine this HAF (High Abrasion Furnace) black with natural or synthetic rubber for tire treads, conveyor belts, industrial hose and other rubber products where you need phenomenal endurance at reasonable cost. For proper compounding procedures and recipes consult Philblack's technical service representatives. Philblack O is shipped in bags or in bulk in hopper cars specially designed to facilitate unloading.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

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PHILBLACK EXPORT SALES DIVISION • 80 BROADWAY • NEW YORK 5, N. Y.

* A Trademark

Philblack A and Philblack O are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton.
West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

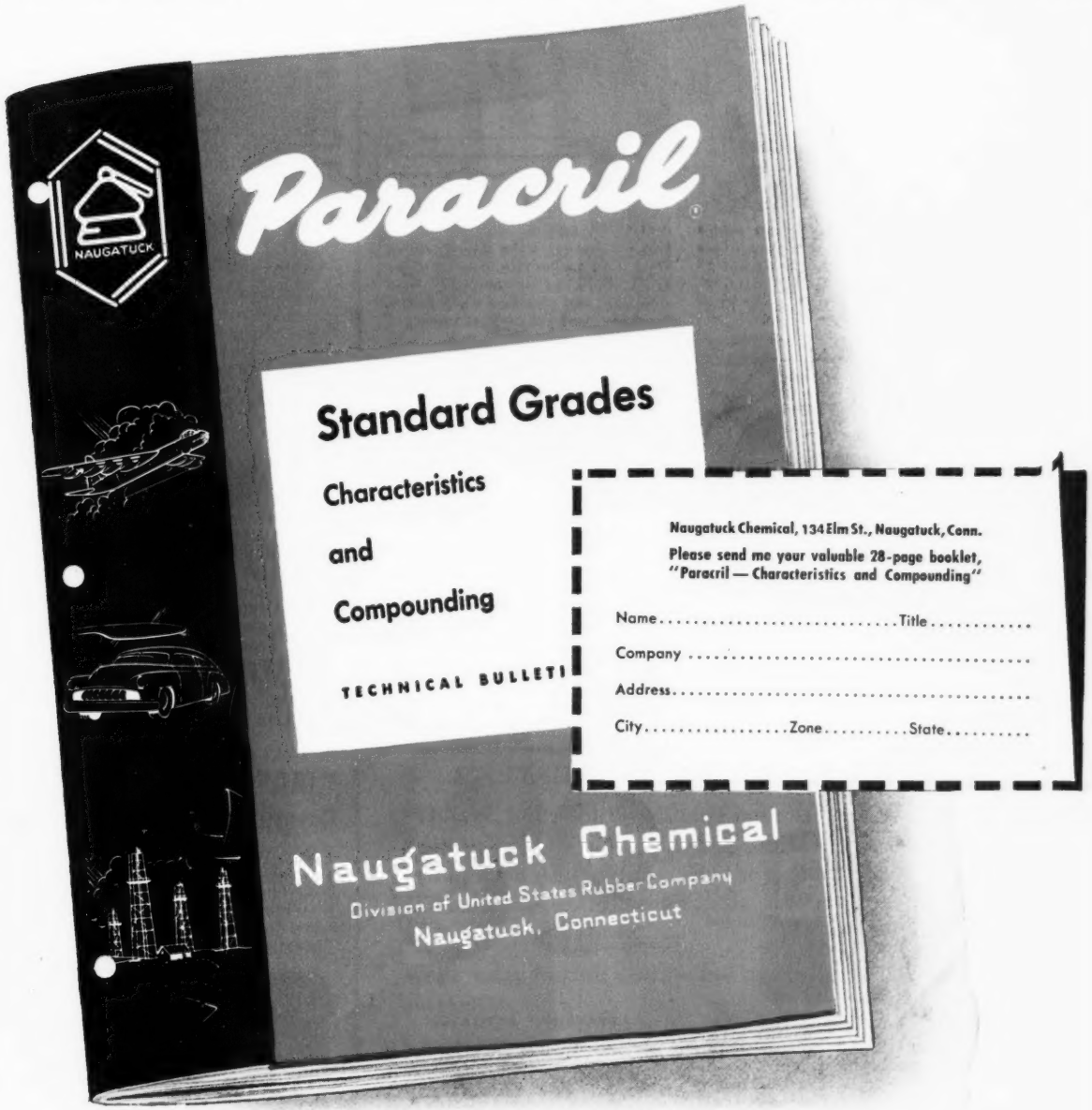
See how many ways
you can use this nitrile type oil-resistant rubber!

Here's a complete technical bulletin on an amazingly versatile chemical rubber. It's designed for your use. Fill out the coupon below!

28 fact-filled pages give important information and "how to" explanations you'll want to use time and time again.

- **current data on properties, uses, compounding, and processing**
- **information and detailed working tables on fillers, pigments, and plasticizers**
- **15 charts illustrating effects of carbon blacks, non-black fillers, and plasticizing agents**
- **test recipes and complete test results for various compounds**
- **easy-to-read summary of relative characteristics of different grades**
- **step-by-step information on formulating for particular requirements**

You'll find Paracril chemical rubber ideal for applications requiring oil resistance over an extremely wide temperature range. And you'll find its excellent processing characteristics and many other desirable properties a great advantage *wherever* rubberlike properties are needed. *Send for your copy of this valuable booklet today!*



Naugatuck Chemical, 134 Elm St., Naugatuck, Conn.

Please send me your valuable 28-page booklet, "Paracril — Characteristics and Compounding"

Name.....Title.....

Company .....

Address.....

City.....Zone.....State.....

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Division of United States Rubber Company

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WESTON TAG

Thermometers

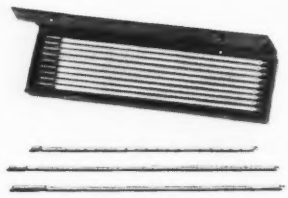
in all forms—ranges—stem lengths—connections

Whether your requirement calls for certified laboratory thermometers . . . or rugged all-metal industrial types . . . or thermometers for remote reading . . . you'll find *exactly* what you require in the Weston-TAG line—*the most comprehensive line of quality thermometers ever offered by ONE manufacturer.* Literature on request. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.

Laboratory

ALL-METAL

—have readable, dial-type scales and corrosion-resisting stainless steel stems—stem lengths from 2" to 24"—ranges from low as −100°F. to high as 1000°F.—accuracy ½ of 1% of thermometer range.



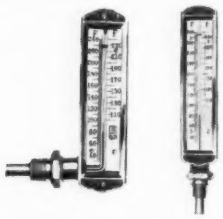
GLASS

—certified sets of ASTM Testing thermometers with overlapping ranges in protective case. Ranges from −36°F. to high as 760°F. Also precision and standard etched stem thermometers for general testing.

Industrial

ALL-METAL

—provide unmatched readability and durability—accuracy within 1% of thermometer range. Available in all types, ranges and stem lengths (2½" to 72") for all requirements.



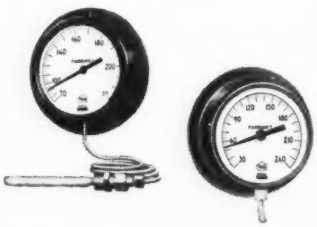
GLASS (Metal Case)

—available in all forms, all ranges, stem lengths and connections. Accuracy within one scale division. Also submarine types, metal and cupcase thermometers.

Remote Reading

ELECTRICAL

—resistor bulb sensing element permits mounting indicator any distance away from point of measurement. *Multiple* remote readings also possible by use of selector switch and several bulbs.



PRESSURE ACTUATED

—for remote reading, in 5, 6 and 8" dial sizes. Ranges from low as −325°F. to high as 1000°F. Accuracy one scale division unaffected by vibration or severe shock. Cases of iron, brass, or plastic.

WESTON *Temperature Instruments*

— TO INDICATE — RECORD — CONTROL

9413

"TAG" Automatic Controllers Record Temperature, Pressure

Pressure, vacuum or temperature can be automatically regulated and recorded with the Pneumatic Recorder-Controllers produced by TAGliabue Instruments Div., Dept. 67, Weston Electrical Instrument Corp., Newark 5, N. J. These devices maintain conditions for which they are set by varying control line air pressure, which operates a diaphragm valve to regulate flow of fluid (gas, steam, liquid) to the equipment being controlled. At the same time, the instrument continuously records actual temperature or pressure on a circular chart.

Operating on an air supply of 18 p.s.i., TAG Recorder-Controllers handle temperatures between −100°F. and 1000°F., vacuum as great as 30" mercury, or pressures up to 7500 p.s.i.

"TAG" Temperature Recorders Chart from −300° to +1000°F.

Accurate written records of varying temperatures are charted by the Temperature Recorders produced by TAGliabue Instruments Div., Dept. 67, Weston Electrical Instrument Corp., Newark 5, N. J. Temperatures as low as −300°F. or as high as +1000°F. can be recorded with these versatile instruments.

Various types of actuations in TAG Temperature Recorders achieve scale expansion for utmost precision over the working ranges. Interchangeable tube systems are laboratory calibrated at the factory. A safety link provides over-range protection. Details are given in Catalog 1210.

"TAG" Pneumatic Controllers Govern Temperature, Pressure

Pressure, vacuum or temperature can be accurately regulated by the Pneumatic Controllers engineered by TAGliabue Instruments Div., Dept. 67, Weston Electrical Instrument Corp., Newark 5, N. J. These trustworthy devices maintain the conditions for which they are set by varying air pressure in a control line, which in turn operates a diaphragm valve to increase or decrease the flow of fluid (air, gas, steam, liquid) to the equipment being controlled.

Operating on an air supply of 18 p.s.i. pressure, TAG controllers handle temperatures between −100°F. and 1000°F., or pressures between 30" vacuum and 7500 p.s.i.

rubber compounders prefer PLIOLITE S-6B

6 to 1

After direct comparison with competitive resins, rubber compounders throughout the industry report they prefer PLIOLITE S-6B—*by nearly six to one!* Specific characteristics of this use-proved Goodyear rubber reinforcing resin mentioned in the survey were:

EASIER PROCESSABILITY
MORE THOROUGH COMPATIBILITY
EXCELLENT PHYSICAL PROPERTIES

PLIOLITE S-6B is already in use in shoe soles, wire insulation, flooring, rubber hose and tubing and a wide range of molded and inflated rubber items. But these are only a few of the potential uses of this leader in the field of copolymers for reinforcing rubber.

Write today for full details, and samples for your own evaluation, to:

Goodyear, Chemical Division, Akron 16, Ohio

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

MOLDS COME CLEAN *Everytime* WITH COLITE!

Just as a housewife butters a muffin tin, you can use Colite on any kind of a rubber mold. And you'll find using this highly-concentrated liquid mold-release, as a spray or sponge, pays off with substantial savings!

You can count on jobs coming out with uniform precision — with no pinching, dragging, trimming or spoilage to contend with — and with a transparent, smooth, satiny finish that insures added sales-appeal.

Non-toxic, non-tacky, odorless Colite, developed especially for the rubber industry, comes in a highly-concentrated form, which you dilute with water to the most effective strength for the stock and job at hand — making it economical to use! Send for a sample to test in your plant, now!

Use as a spray or sponge on

Tire molds
General molds
Recapping molds
Inner-tube molds

★

Use as a lubricant for

Tires or Mandrels

★

For light colored stock

SPECIFY COLITE D43D

BEACON
PURITY · UNIFORMITY · DEPENDABILITY
Chemical Industries, Inc.
BOSTON 30, MASSACHUSETTS

For WHITE SIDEWALLS that STAY white!

Use "non-staining" U. S. RECLAIM #3013 in your carcass

Here it is Spring and, once again, a young man's fancy can turn to WHITE sidewalls as well as other things. The only trouble is that, as a manufacturer, you have to face up to *higher costs* all along the line. That's when new improved U.S. Reclaims can help you out of plenty of production problems.

For instance, our new "3013" can help you produce a BETTER white sidewall tire at a reasonable cost. As you well know, when ordinary reclaims are used in the carcass of such a tire, a "bleeding" process many times "stains" the white sidewall even before your dealer can sell it. We've licked that bugaboo with "3013" . . . a specially developed reclaim that completely eliminates this nightmare for manufacturers.

In addition, we have good news about one of our *exclusive* DIP-PROCESS reclaims! Recent development work here indicates that our amazing new R-400NS possesses excellent non-staining properties. By the time this magazine gets to press, we will have some REAL NEWS for you. Drop us a line now, for the latest report!

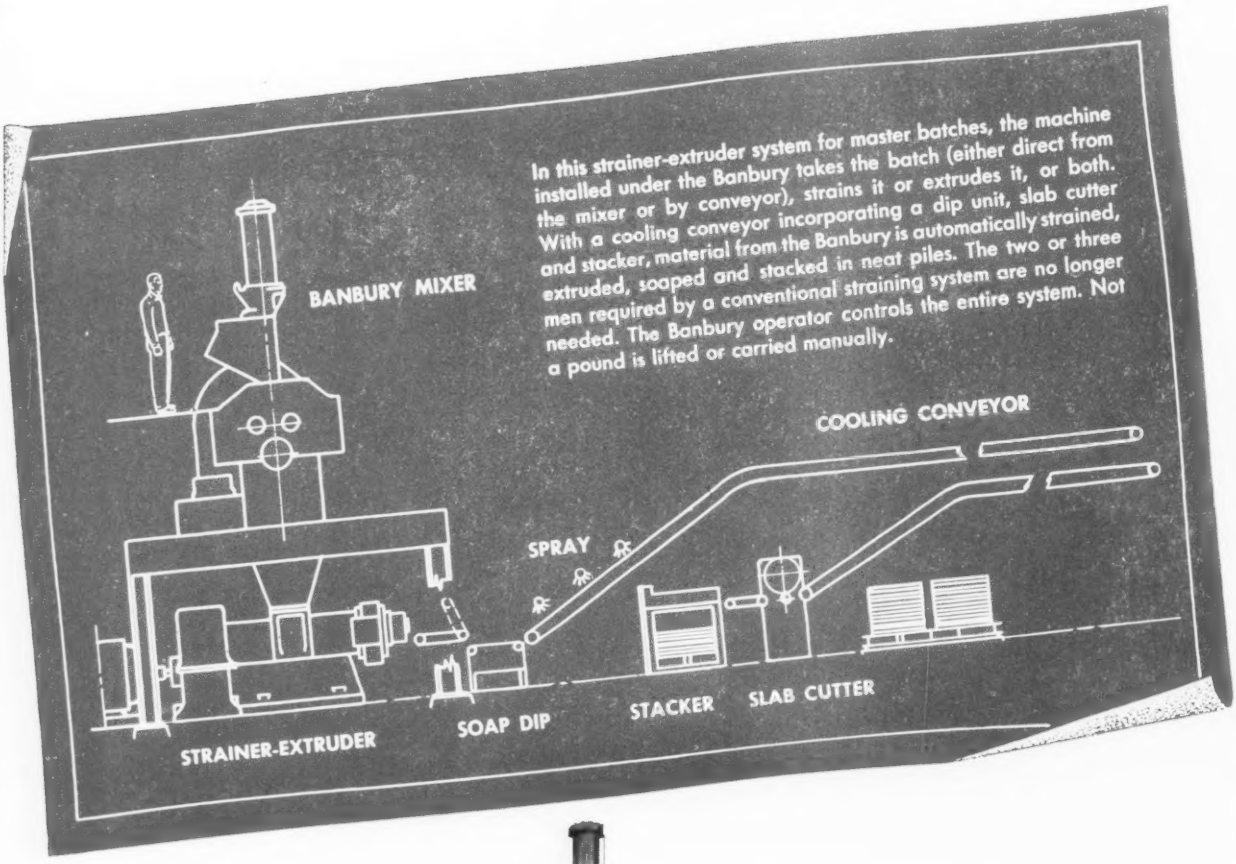
Always keep reclaims in your formula and always look to U. S. for the best. U. S. Rubber Reclaiming Company, Inc., P. O. Box 365, Buffalo 5, N. Y. Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

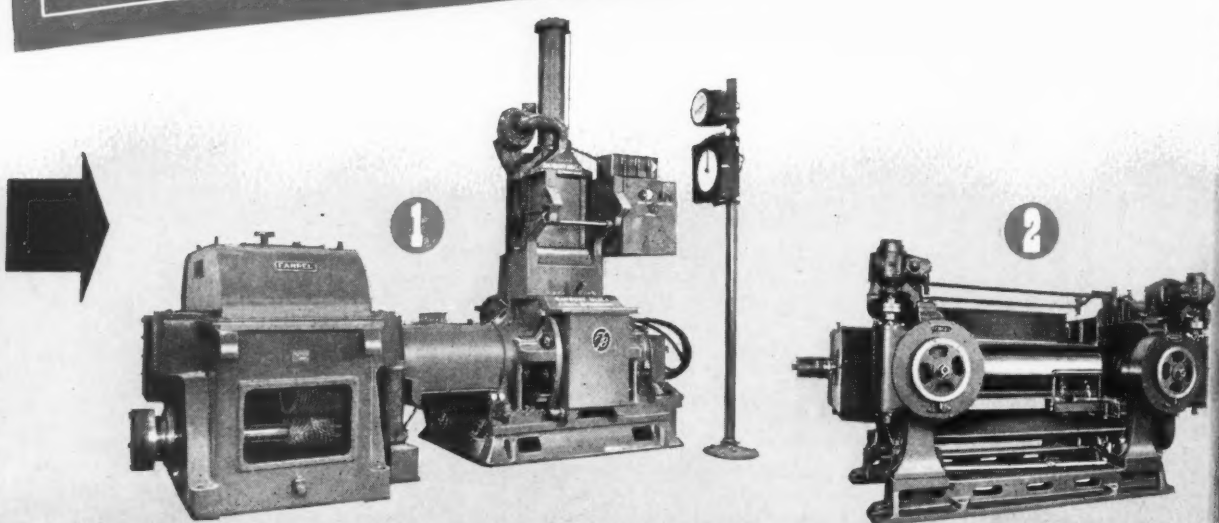
69 years serving the industry solely as reclaimers

U.S. RUBBER RECLAIMING COMPANY, INC.

COMPLETE PROCESSING LAYOUTS

. . . engineered by Far


BANBURY MIXER
In this strainer-extruder system for master batches, the machine installed under the Banbury takes the batch (either direct from the mixer or by conveyor), strains it or extrudes it, or both. With a cooling conveyor incorporating a dip unit, slab cutter and stacker, material from the Banbury is automatically strained, extruded, soaped and stacked in neat piles. The two or three men required by a conventional straining system are no longer needed. The Banbury operator controls the entire system. Not a pound is lifted or carried manually.
COOLING CONVEYOR
SPRAY
STRAINER-EXTRUDER
SOAP DIP
STACKER
SLAB CUTTER



1. BANBURY MIXERS are widely used in the processing of rubber and plastics. They produce uniformly mixed stocks of superior quality, with reduction in production cost and elimination of dust and fume hazards. They are made in seven sizes, from the laboratory size B to the No. 27 with batch capacity of 1000 pounds (1.50 specific gravity stock). *Bulletin No. 189.

2. MILLS — Farrel-Birmingham mills for mixing, grinding, warming and sheeting are built in a complete range of sizes, from 6" x 13" for the laboratary up to 28" x 84" heavy-duty machines for the factory. For special requirements, variations in designs are obtainable, often from existing plans. *Bulletin No. 173.

Farrel-Birmingham®

For many years Farrel-Birmingham has made a specialty of engineering complete setups for processing rubber and plastics. The F-B engineering department is staffed by men with special training and unusual qualifications who have had many years of experience in the design of machinery built by the company.

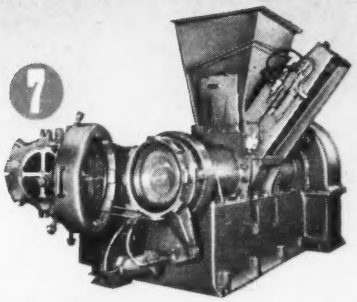
The layout shown here is typical of successful installations developed by Farrel-Birmingham engineers. These installations are composed of production units designed for most efficient step-by-step conversion of raw material to the finished or semi-finished product, when matched in capacity for planned processing flow. Production flows smoothly, without costly interruptions, and manual aid and supervision are reduced to a minimum.

Farrel-Birmingham engineers will be glad to discuss the possibility of improving your production efficiency or cutting your handling costs through planned processing flow. Write for further information about any of the production units described in these pages.

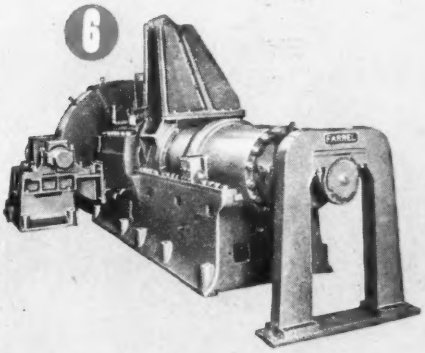
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices:
Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham®

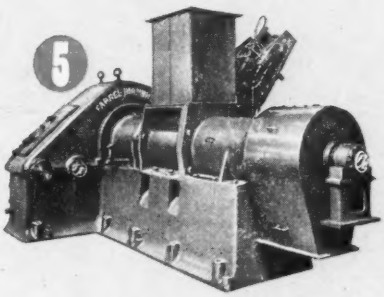
Ask for bulletins by subject and number.



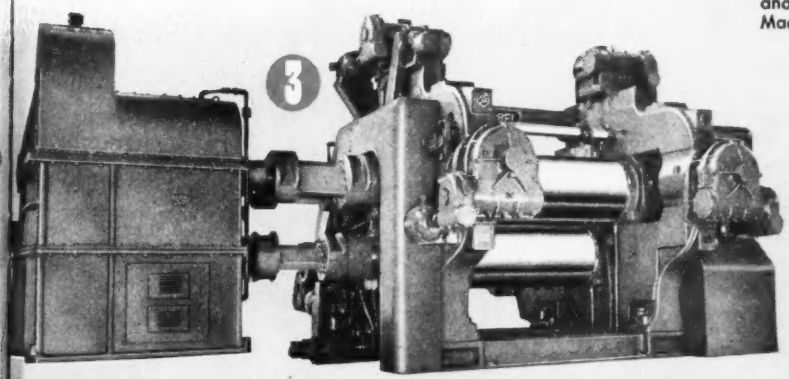
7. STRAINER-EXTRUDERS are designed to receive stock directly from a Banbury and discharge directly into a calender or other processing unit, eliminating the need for sheeting or warming mills. Made in 7", 8½" and 12" sizes to match the capacities of standard 3A, 9 and 11 Banburys. *Bulletin No. 33-R-502.



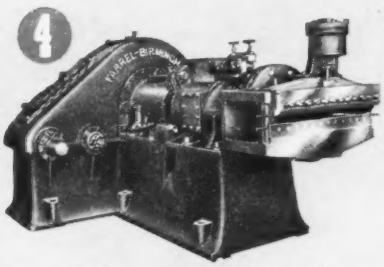
6. GORDON PLASTICATORS are designed for breaking down rubber. They soften the stock by mechanical action so that it may be more readily worked and mixed with compounding ingredients in subsequent operations. Made in 12", 15" and 20" sizes.



5. HALE PELLETIZERS — Designed to transform hard-to-handle rubber into small, free-flowing pellets, the Hale pelletizer also improves the plasticity of the stock and gives better dispersion of the various ingredients. Machines are built in 7", 12", 15" and 20" sizes.



3. CALENDERS — Farrel-Birmingham calenders are made in any size for both laboratory and factory. Designed to fit individual requirements, they are made with any number and arrangement of rolls and fitted with attachments to suit their particular function. *Bulletin No. 174.



4. TUBING AND STRAINING MACHINES — Built for high-speed, low-temperature operation, these machines extrude stock of high density and uniformity. Exclusive roller feed maintains a constant supply of stock to the screw and eliminates trapped air. Available in 6", 8", 8½" and 10" sizes. *Bulletin No. 175.

Thiokol* Plasticizers are again available!

WITHOUT RATINGS

TP-90B

Highly compatible with GR-S, Neoprene, Buna N's and Natural Rubber. Imparts excellent low temperature flexibility and resilience. It is both economical and efficient.

TP-95

For plasticizing Buna N rubbers, GR-M and vinyl resins. Imparts excellent low temperature flexibility or good heat resistance. It is economical and efficient.

TECHNICAL INFORMATION AND SAMPLES ON REQUEST

*THIOKOL, REG. U.S. PAT. OFF.

784 NORTH CLINTON AVENUE

Thiokol CORPORATION

TRENTON 7, NEW JERSEY

Purecal—a GR-S and dollar-saver

William M. Moser (left) and Ed Hillendahl, Pacific Tire and Rubber Company executives, inspect GR-S carcass stock containing Wyandotte PURECAL.

"Wyandotte Purecal T improves over-all quality in GR-S tire stocks"

—William M. Moser, *Development Mgr.*

Pacific Tire and Rubber Company executive tells how this Wyandotte product gives higher tear resistance and good cord adhesion in GR-S carcass stocks:

"We demand the highest quality in our products," says Mr. William M. Moser, development manager. "A great deal of our research and development work is devoted to continual improvement of quality and maintenance of high standards.

"Our tests and subsequent experience, using Wyandotte PURECAL* T in GR-S carcass stock as a reinforcing filler, have shown PURECAL to be an exceptionally fine aid to quality. With it in our carcass stock, we get higher tear resistance, good cord adhesion between plies, excellent building tack, and improved quality of GR-S stock.

"Using PURECAL in our processing, we can run 100% GR-S stock on our 4-roll calender without the necessity of regrinding the rolls."

PURECAL is becoming an increasingly important ingredient in the manufacture of a wide range of rubber products, including tires, wire insulation, fire hose, and industrial belts. For technical assistance, samples, or a free copy of "PURECAL in GR-S," write to *Wyandotte Chemicals Corporation, Wyandotte, Michigan, or phone AVenue 2-3300, Wyandotte. Offices in Principal Cities.*

* TRADEMARK

Wyandotte
CHEMICALS

Sharples

DICHLOROPENTANES 40

- Chlorinated Solvent
- Inexpensive
- Readily Available

PROPERTIES

Color	Brown to Black
Specific Gravity @ 20°/20°C.	1.02—1.15
Acidity as HCl	0.5% (max.)
Water Content	1.0% (max.)
Distillation: 99% above	130°C.
Flash Point	105°F.
Fire Point	115°F.

Write or telephone for a sample

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC.

350 Fifth Ave., New York • 80 E. Jackson Blvd., Chicago

Martin, Hoyt & Milne, San Francisco • Los Angeles • Seattle • Portland

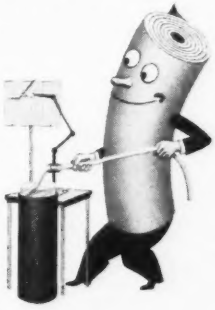
Shawinigan Chemicals Ltd., Montreal • Toronto

Airco Company International, New York

MT. VERNON FABRICS

Give You Greater

Fabric Uniformity



Shown is one of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here evenness of sliver is being checked with linear regularity tester.

Mt. Vernon-Woodberry Mills

Branch Offices: Chicago • Atlanta • Baltimore • Boston

TURNER HALSEY COMPANY
Selling Agents
40 WORTH ST. · NEW YORK

Los Angeles

ACTIVATOR NEWS

HORSE HEAD PRODUCTS

A supplement to THE ACTIVATOR—the house organ issued by The New Jersey Zinc Company for over 15 years to aid the Rubber Industry in its use of Zinc Oxide.

ANNOUNCING

The FIRST French Process Zinc Oxide Surface-Treated with Propionic Acid

PROTOX*-168

Improves Reinforcement 2 Important Ways

1. 130% MORE SPECIFIC SURFACE AREA

Made by a modified French Process, its finer particle size has a specific surface area of 8 sq. meters per gram. (Conventional French Process zinc oxide has 3.5 sq. meters.)

2. BETTER DISPERSION IN RUBBER

Protox-168, prepared by treating Kadox-72 with propionic acid, has the outstanding dispersion characteristics of the other Protox brands.

Better dispersion of Protox-168, compared with Kadox-72 or conventional French Process zinc oxide, results in improved tensiles, tear and modulus.

May we send you samples of Protox-168 for your tests?

*U. S. Patents 2,303,329 and 2,303,330

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments

. . . most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

USE of INDONEX

REG. U.S. PAT. OFF.

PLASTICIZERS

in Rubber, Resinous, and related Compositions

has increased tenfold in the last 5 years

If you are not one of our customers, are you on our list for circulars covering general and specific uses?

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An exceptionally active chemical softener . . . gives minimum shrinkage of milled and extruded stocks . . . minimizes break-down time . . . is non-staining . . . has no effect on rate of cure.

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all in partnership with rubber...

but no two wires alike!

● Pictured above are four typical examples of the many special-purpose wires developed by National-Standard for wire-in-rubber products.

They do have one essential quality in common —a highly developed affinity for adhesion with rubber. But beyond that, each has a different job to do . . . and is painstakingly engineered to do it . . . effectively!

For years National-Standard has specialized in improving the behavior of wire in rubber—digging into all the intricacies of application, fabrication, finish, corrosion, strength, elongation, adhesion and innumerable details you might never bother with.

Main reason for all this research, this "groundwork", is to help you improve your products, increase production, conserve materials and cut costs! Perhaps you now face *new* defense production problems involving wire. Remember, National-Standard service is always at *your* service.

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NATIONAL-STANDARD Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL	*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD	*Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
REYNOLDS WIRE	*Dixon, Illinois*	Industrial Wire Cloth
WAGNER LITHO MACHINERY	*Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS	*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes

Use United Blacks

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. . . for durability
DIXIEDENSED 77 (EPC)
DIXIEDENSED HM (MPC)

These are the finest rubber grade channel blacks made. They are designed to give the compounder exactly what he is looking for in channel blacks - - - cool mixing, easy processing, high reinforcement, and excellent service performance.

Insist on United Blacks.

UNITED CARBON COMPANY, INC.
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CANADA: CANADIAN INDUSTRIES, LIMITED

AETNA-STANDARD BUYS RUBBER AND PLASTICS DIVISION OF NATIONAL-ERIE

E. E. Swartswelter, President of The Aetna-Standard Engineering Company, Pittsburgh, Pa., announces the purchase of the rubber and plastics machinery division of the National-Erie Corporation, Erie, Pa., a subsidiary of Bucyrus-Erie Company.

The purchase includes the drawings, patents and records.

Aetna-Standard will manufacture a complete line of rubber and plastics machinery in their large, well equipped plant at Warren, Ohio. Sales and design engineering will be handled by Hale & Kullgren, Inc., Akron, Ohio.

In the ferrous and non-ferrous industries, Aetna-Standard is well known for continuous butt weld pipe mills, seamless tube mills, continuous coating lines, flat-rolled equipment and drawbenches. The company has also been active in the rubber machinery field as a rebuilder of Banbury Mixers and in the development of heavy basic machinery.

The company will take over many of the orders on National-Erie's books and will solicit new orders through Hale & Kullgren, Inc.

PRODUCTS

MILLS • WASHERS • CRACKERS
• SHEETERS • REFINERS • EX-
TRUDERS • STRAINERS • INSU-
LATORS • BANBURY MIXERS •
HYDRAULIC PLATEN PRESSES •
HORIZONTAL VULCANIZERS •
REVULCANIZERS • SIMPLEX
QUICK OPENING DOORS • SPE-
IAL MACHINERY

HALE & KULLGREN, INC., HANDLE SALES

The well known firm of (Andy) Hale & (Gil) Kullgren, Inc., Akron, Ohio, will continue to handle the sales, design engineering and development work for Aetna-Standard. The engineering and sales personnel of National-Erie will join Hale & Kullgren in Akron, Ohio.

Sales Distributors and Designers
HALE & KULLGREN, INC., Akron, Ohio

50 YEARS OF CREATIVE ENGINEERING

Aetna-Standard has a long and enviable record in the business of engineering and manufacturing machinery for the ferrous and non-ferrous industries. They have two large, well equipped plants and are now completing a major expansion program to provide the best facilities for producing production machinery.

Aetna-Standard

THE AETNA-STANDARD ENGINEERING COMPANY • PITTSBURGH, PA.

Plants in Warren, Ohio · Ellwood City, Pennsylvania

For centralized control with greater flexibility

Announcing

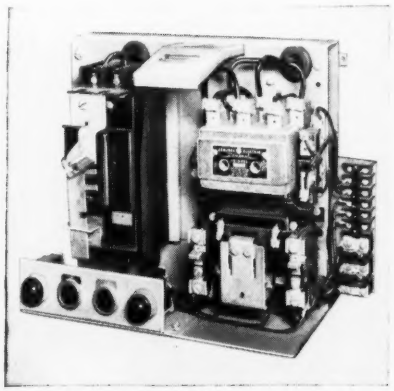
Here's an attractive, versatile new motor control center that you can easily plan, install, and service. Compact—a section is only 20 inches wide, 20 inches deep, and 90 inches high. It will accommodate NEMA Size 1 through 4 starter units back to back.

A four-inch wiring trough provides ample space for outgoing wires and cables. Starter units are designed for easy inspection and servicing.

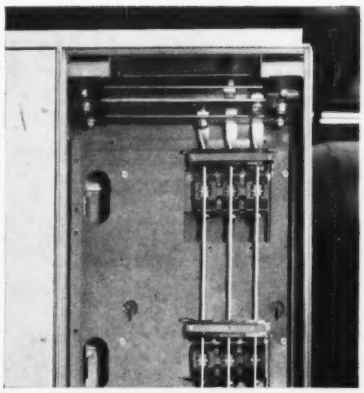
There are many provisions for protecting personnel from mechanical and electrical injury. This G-E motor control center has also been laboratory tested to assure protection against 25,000 amperes short-circuit current. More information on this new, modern motor control center in bulletin GEA-4979A. Write your nearest G-E office today. *General Electric Co., Schenectady, N. Y.*

THIS COMPACT, ATTRACTIVE, G-E MOTOR CONTROL CENTER provides the most modern method of controlling a-c motors up to 200 horsepower from a central location.

the NEW General Electric Motor Control Center

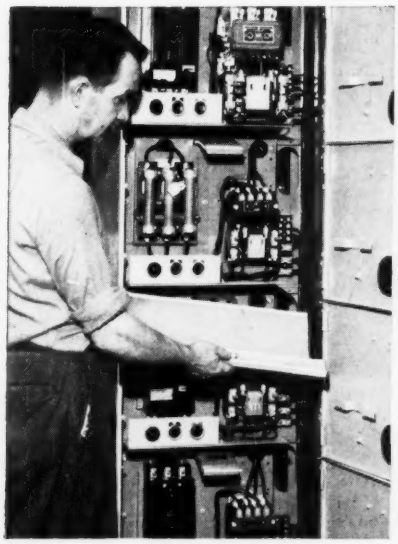


STARTER UNITS ARE COMPLETELY ACCESSIBLE. All components—even the pilot devices—are mounted on a sturdy frame with all terminals front connected.

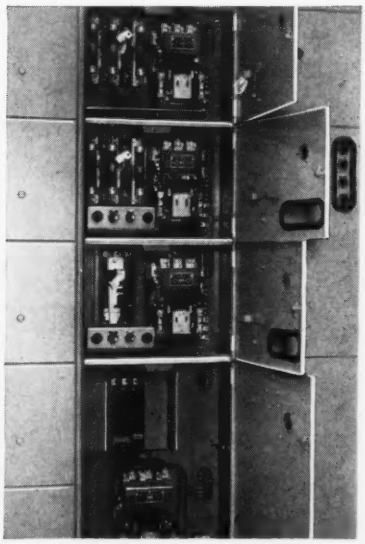


DESIGNED TO PROTECT PERSONNEL. Rear view shows metal barrier that separates starter unit space from bus bars. Vertical section features new "I-beam" construction for strength.

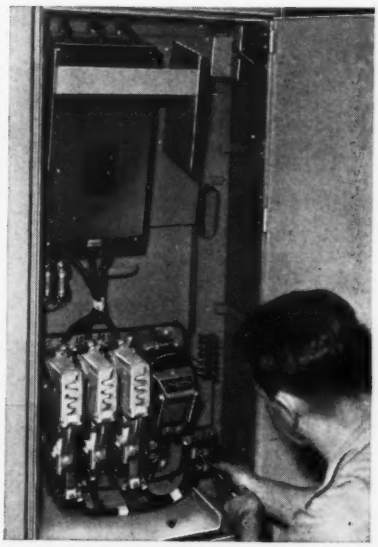
EASY TO INSTALL AND INSPECT. Sturdy, light-weight starter units are easy to handle, and interchangeable because of standardized dimensions and components.



EASY TO WIRE. Ample four-inch wiring trough is completely accessible by removing horizontal metal barriers between units. Barriers isolate and support units as they are slid into section.



VERSATILE. Starter unit sizes and types are in even multiples of 14 inches. Fusible and circuit breaker combinations of the same starter size are interchangeable without changing doors.



EASY TO SERVICE. Doors swing wide (no hinge wiring); unit is easily disconnected from bus and held in test position for protected servicing.

GENERAL ELECTRIC

ST. JOE *lead-free* ZINC OXIDES

a Grade for Every Purpose

Our unique electrothermic smelting method, the latest improvement in the production of zinc oxide by the American Process, ensures the uniformity of these St. Joe pigments because of the close control exercised at the most critical point — *the instant of oxidation.* This control applies to both chemical composition and particle size, and is largely responsible for the preference accorded our products by a steadily increasing number of zinc oxide consumers.

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***TYPICAL INJECTION MOLDINGS** made on standard equipment using PLIOVIC Goodyear's use-proved vinyl resin.*

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Toughness, superior oil-grease resistance and good aging characteristics mark injection moldings made with PLIOVIC—Goodyear's versatile vinyl resin. Typical examples are the luggage welting, furniture boot and automobile arm rest shown.

Compounders have found that PLIOVIC offers versatility of formulation—can be more highly loaded yet requires less plasticizer, compared with competitive resins. And PLIOVIC gives a wide range of bright color possibilities, at low cost, as well.

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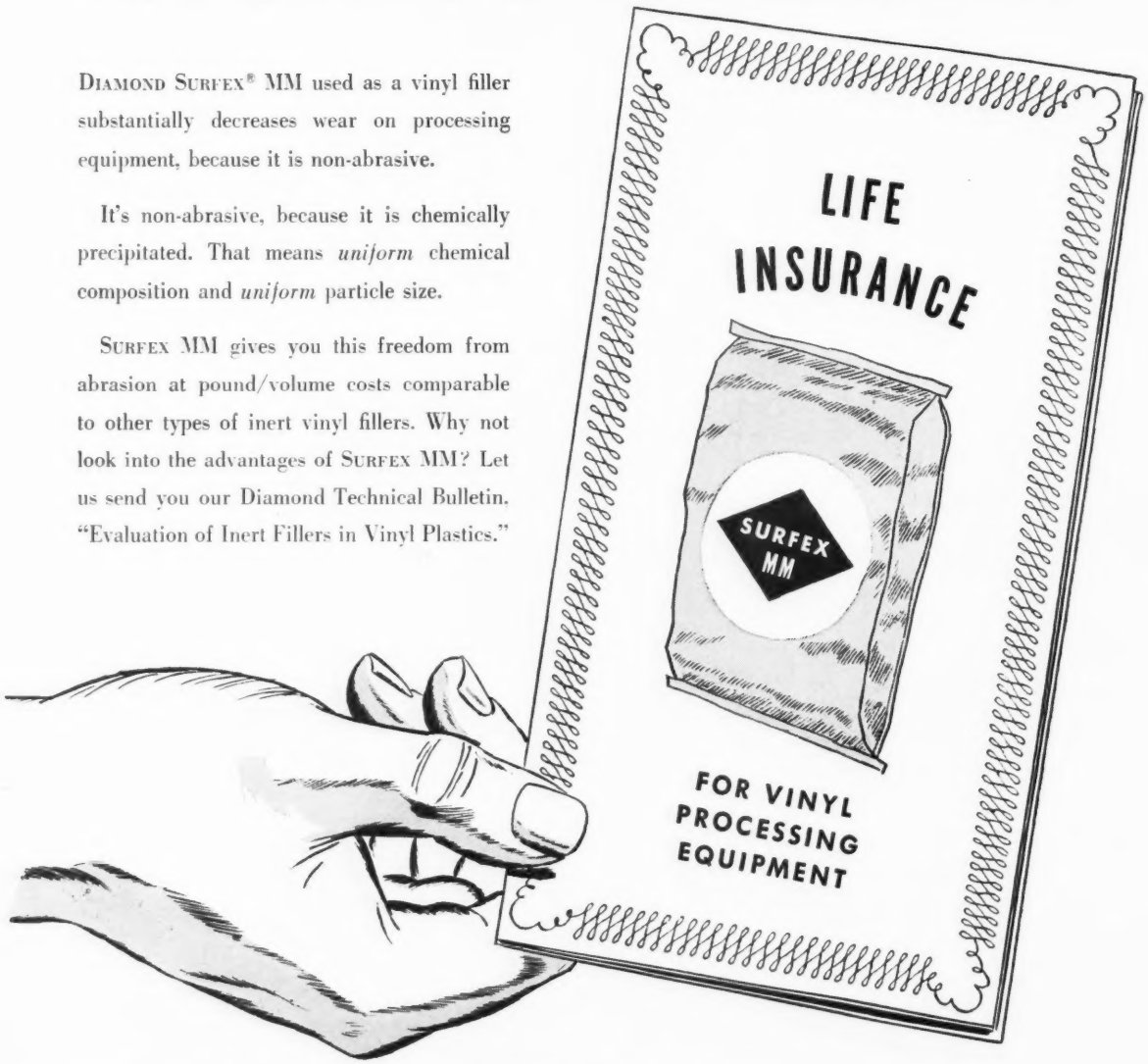

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LIKE A NEEDLE IN A HAYSTACK

BUT IS IT?

YOUR PLANT EFFICIENCY IS QUESTIONABLE

if the rubber surface lubricant you are now using isn't a liquid type as well as one which imparts adhesion free surfaces to uncured compounds. GLYCERIZED LUBRICANT LIQUID CONCENTRATE will eliminate stickiness between stacked slabs, sheets, or rolled stock, along with better working conditions. It can also be used as a release agent for molds, air and water bags, mandrels, cores, belt drums, extruded goods, insulated wire, and cable. You will find this easy to handle liquid a definite help in stepping up plant efficiency and improved working conditions because, through its use, the usual "Dust Nuisance" problem is eliminated.

Can you afford to let production lag because of the lack of proper materials, or permit handicaps to hamper the work of your employees?

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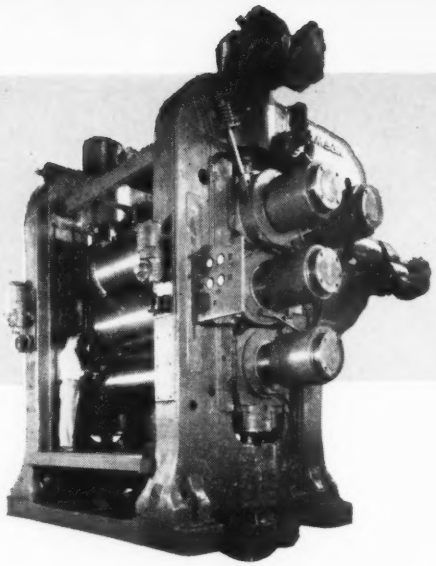
RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street Chicago 32 U S A

CALENDERS

We make all types and sizes of Calenders, precision designed for extremely close tolerances to meet the most exacting requirements in the production of plastics film or the coating of fabrics with rubber or plastics. The unit shown is an ADAMSON UNITED 32″ x 92″, 4-Roll Plastics Calender geared to produce 72″ wide vinyl film, 2 mils. or less in thickness at speeds to 150 YPM.



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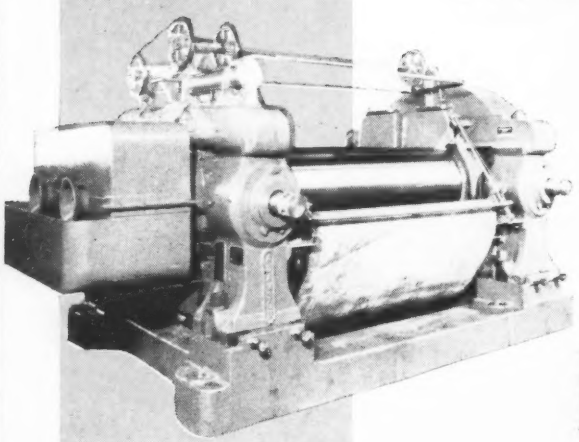
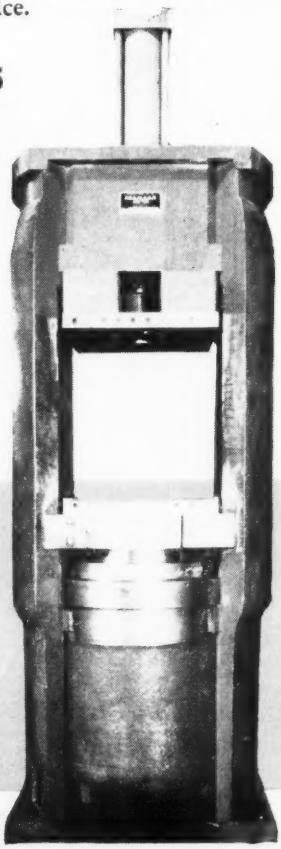
. . . designed and built by. . . .



We engineer and build all types of individual production units and complete electronically controlled trains with all accessories for every Rubber or Plastics processing requirement. Our highly specialized engineering and production facilities plus the combined research and technical abilities of United Engineering and Foundry Company, and the manufacturing capacity of eight modern plants, are at your service.

PRESSES

We build all types of presses for the rubber, plastics and plywood industries. Shown is a new 24″ ADAMSON UNITED BARREL TYPE PRESS with transfer cylinder. This new press, an exclusive ADAMSON UNITED development, exerts up to 76% more platen pressure than conventional types without change in present hydraulic lines. Stock is transferred into the mold cavities through sprues which reduces cure time and flash trimming to a minimum. Sizes range from 12″ through 32″ with larger sizes available to specification. Presses Catalog No. 462 on request.

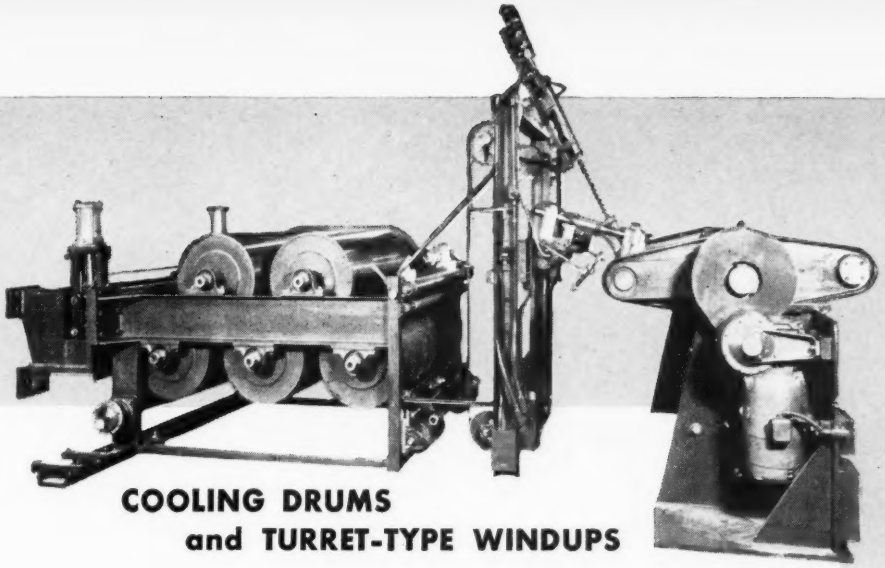


MILLS

An 84″ Individual Mill equipped with a mixing apron. ADAMSON UNITED Mills may be had in all sizes from 6″ x 16″ to 28″ x 84″, driven individually; in pairs with right angle reducer between the units, or grouped on a line shaft with reducer at one end of the shaft. Apron, as shown, can be installed on any type of existing mill. New catalog No. 463 on request.

AUTOCLAVES or VULCANIZERS

Built to specific requirements from 18 inches to 15 feet in diameter, any length, vertical or horizontal to withstand internal pressures as high as 1000 lbs.-per-square-inch. The Pot Heater shown is a vertical, cylinder-operated Breech-door type. Write for Vulcanizer Catalog No. 461.



COOLING DRUMS
and TURRET-TYPE WINDUPS

This is a standard type of accessory equipment arrangement for plastics film. It consists of embossing equipment; cooling unit; slitting devices; compensator stand and automatic turret windup. The turret windup stand is a center-drive-type with automatic indexing equipment, yardage counter, and adjustable tension control. We design and build entire calendering process systems including all accessory equipment.

PRODUCTION UNITS

..... ADAMSON UNITED

BRAKE and TIRE TESTING MACHINES

Installation shows an 84" Adamson United High-Speed Jet Airplane Brake and Tire Testing Machine of the inertia type. We have built similar machines as large as 16 feet in diameter for speeds up to 250 M.P.H. and tire loads to 150,000 pounds.

Wire, phone or write us today. No obligation.

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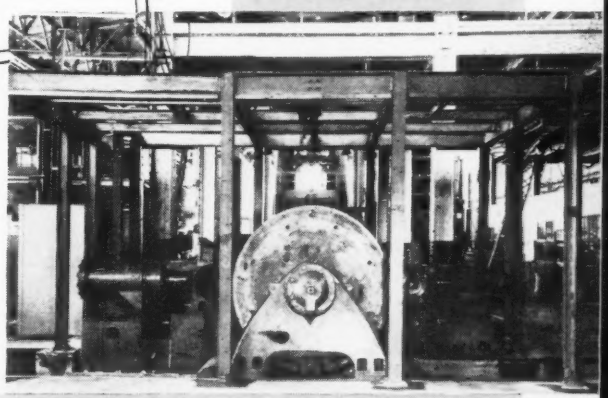

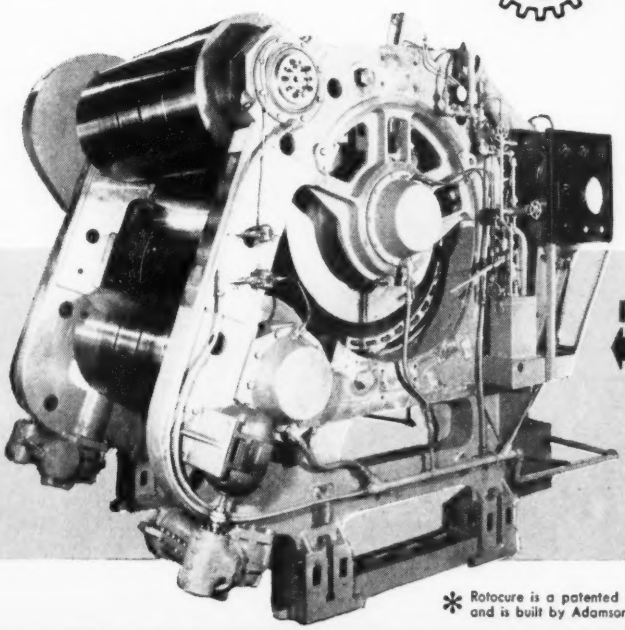

ROTOCURE*

A new machine for the continuous curing of all flat rubber or plastics articles with smooth or designed surfaces. Rotocure increases production through continuous operation without opening, cooling, reheating and closing. It eliminates overcuring or undercuring of the over-lap areas occurring on conventional presses. Roll and belt changes, incident to design requirements, can be made on this new 60" x80" Rotocure in one-tenth the time formerly required.

* Rotocure is a patented development of Boston Woven Hose and Rubber Co. and is built by Adamson United Co. under a licensing arrangement.

IF YOU WANT

- **EASIER PROCESSING**
- **BETTER QUALITY**
- **LOWER COST**

in white sidewall compounds . . .

replace most of the zinc oxide with HI-SIL

Production of white sidewall tires is again permitted under the provisions of the recently amended M-2 Rubber Control Order.

Compounders who, prior to restrictions, ran natural rubber or natural rubber-neoprene compounds loaded with titanium oxide and zinc oxide will do well to consider replacement of the latter pigment with Hi-Sil retaining only enough zinc oxide for the activation.

Replacing most of the zinc oxide with Hi-Sil offers advantages in manufacturing white sidewall tires and results in better quality at lower cost.

These are among the advantages you can expect with HI-SIL

IN PROCESSING

1. **EASIER TO BUILD.** It is easier to build tires with Hi-Sil loaded white sidewall compounds. Highly loaded zinc oxide stocks containing no Hi-Sil are soft and sidewalls extruded from them are easily deformed in storage and handling.

2. **PREVENTS LIGHT SPOTS.** Tires having Hi-Sil loaded white sidewalls come out of the molds with fewer light spots. Highly loaded zinc oxide stocks containing no Hi-Sil are soft and flow too readily. Consequently, air is trapped between the uncured tire and the mold and the resulting cured tire has light spots in the sidewall—areas where it has not completely filled the mold.

3. **PREVENTS TORN SPOTS.** Tires having Hi-Sil loaded white sidewalls come out of the molds with fewer torn spots at the vents. Highly loaded zinc oxide stocks containing no Hi-Sil are too soft and flow into the mold vents. This stock subsequently tears off when the cured tire is removed from the mold. Hi-Sil stocks, being stiffer and having better hot tear, prevent such blemishes. Loss of mold time while vents are cleaned is eliminated.

4. **EASIER TO BUFF.** Tires having Hi-Sil loaded white sidewalls are easier to buff. Highly loaded zinc oxide stocks, containing no Hi-Sil, have low modulus. Consequently, stock stretches with the buffer instead of resisting it. Hi-Sil stocks are easy to buff. Brands and size marks still have sharp, distinct edges after buffing.

IN QUALITY

5. **MORE SERVICEABLE.** Hi-Sil loaded white sidewall stocks have better snag and tear resistance and are more resistant to curb scuffing.

IN COST

6. **LOWER VOLUME COST.** Hi-Sil has a lower pound cost than zinc oxide. Specific gravity of Hi-Sil is only 1.95 compared with 5.57 for zinc oxide. Therefore, the volume cost of Hi-Sil is less than one-quarter that of zinc oxide:

Volume cost of HI-SIL
11¢ x 1.95 equals 21.45¢

Volume cost of ZINC OXIDE
16¢ to 18¼¢ x 5.57
equals 89.12¢ to $1.02

Resume your white sidewall production by using Hi-Sil in your compounds. Columbia-Southern's Technical Staff will be glad to assist you in getting started, or will offer recommendations on any of your rubber compounding problems.

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VOLUME I

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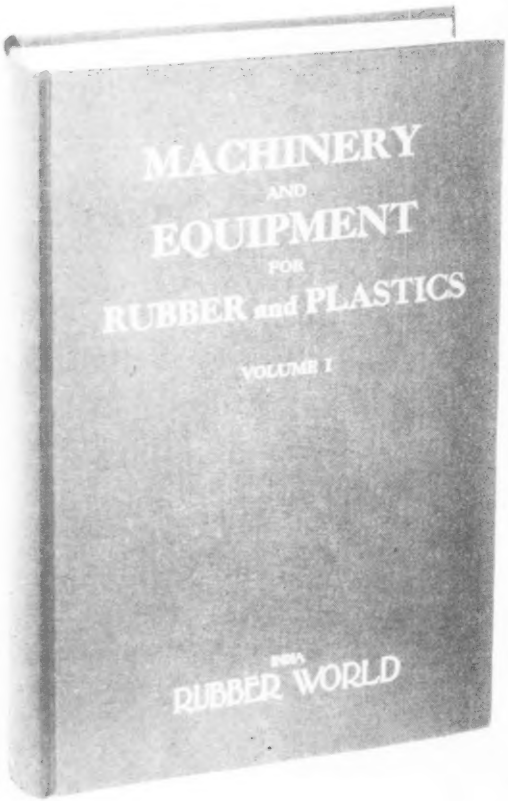

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Volume II — Supplementary Machinery and Equipment — is now in preparation and will be published in the near future.

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VOLUME I

PRIMARY MACHINERY AND EQUIPMENT

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Chapter 11. Web Coating & Handling Equipment
Chapter 12. Pressure Vessels
Chapter 13. Heaters, Dryers and Coolers
Chapter 14. Tire & Tube Machinery
Chapter 15. Hose & Belting Machinery
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3. *The unique property of increasing the effect of most commercial antioxidants when used in conjunction with* STABILITE. *The effect of such mixtures is greater than the components.*

For the protection of your rubber products use STABILITE; for maximum resistance to oxidation, heat, sunchecking and mechanical flexing replace part of your present antioxidant with STABILITE.

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RUBBER and PLASTICS processing machines manufactured by EEMCO are built for *long life* and *heavy duty* by expert craftsmen with many years of experience. Because of their extra sturdy construction they assure *maximum production.* You'll find EEMCO rubber and plastics processing machines in use throughout the world—giving their owners uninterrupted and trouble-free service. Learn more about the *fast delivery* schedules, the *low upkeep,* greater profits and *speedier production* made possible by EEMCO.

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RUBBER and PLASTICS MACHINERY DIVISION

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'TUF-GRIP' is tops for extra strong bonding.
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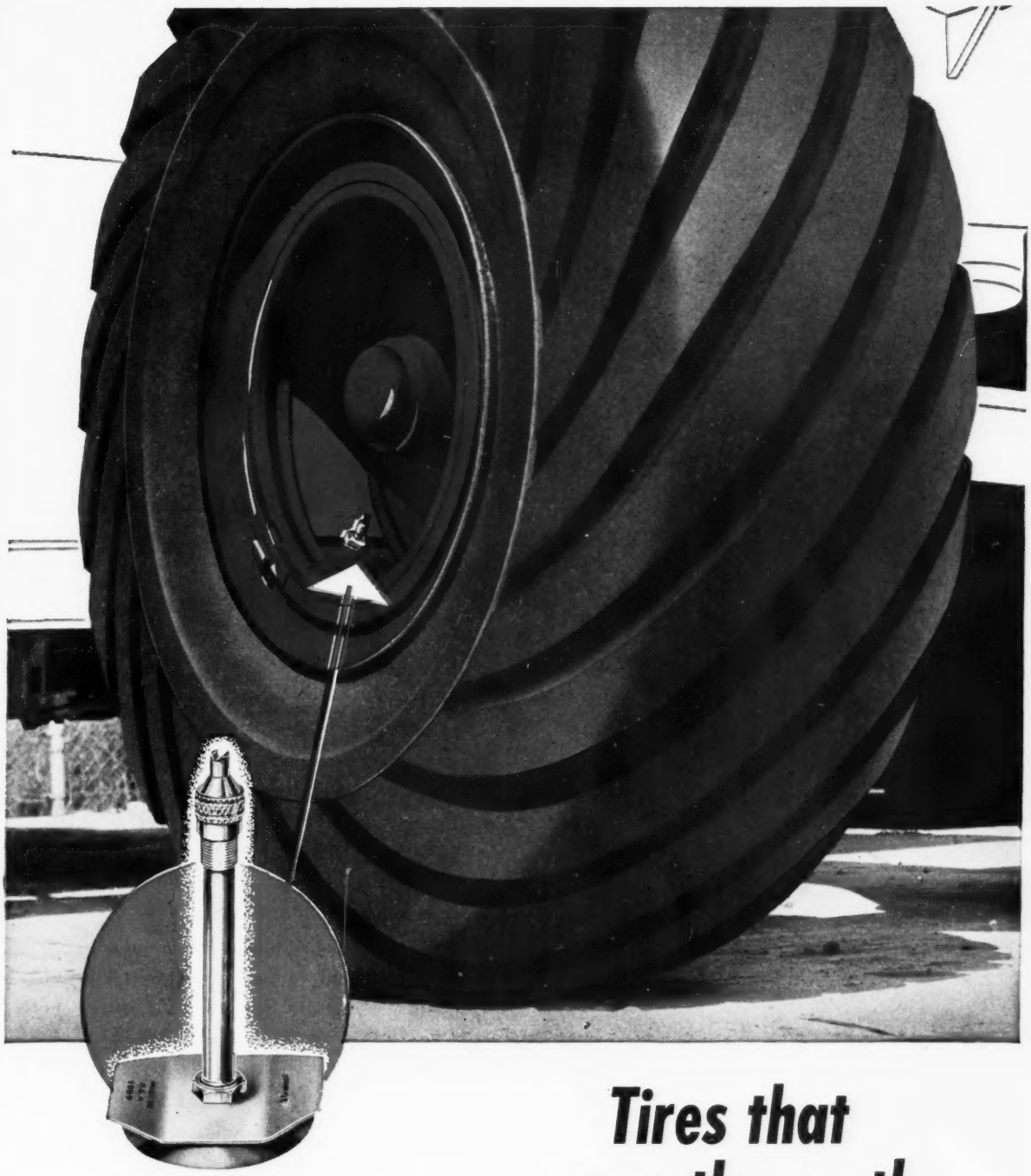

Tires that move the earth

Giant earthmovers have changed the face of our country . . . building roads, laying foundations, even the mining of open-strip ore veins. These machines of progress are made possible and practical by the ingenuity of America's tire manufacturers. Vital to proper performance of these giant tires is the valve that *locks* the air in the tire.

Schrader—top tire valve manufacturer—actually produced the first working samples of large bore tire valves in cooperation with the tire industry. What started as an experimental development is now a complete, practical line of Schrader Products to help the industry move the earth.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.
Division of Scovill Manufacturing Company, Incorporated

Schrader
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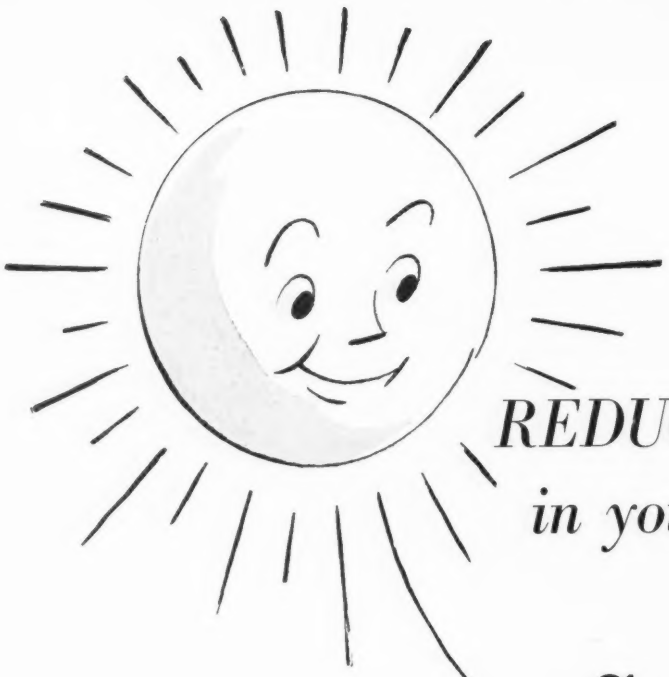
FIRST NAME IN TIRE VALVES
FOR ORIGINAL EQUIPMENT AND REPLACEMENT



How to REDUCE BLISTERING in your tile processing with

SOLKA-FLOC®

It's an easy job. Just use 20 volumes of SOLKA-FLOC to replace an equal volume of mineral filler. In addition to reduced blistering you'll get harder, smoother surfaces . . . sharper designs . . . controlled shrinkage . . . reduced nerve . . . easier processing.

SOLKA-FLOC, a highly purified cellulose, has found wide application in the rubber field. In fact, it has proved to be such a valuable processing aid in the manufacture of such products as tiling, soling, matting, molded goods, extruded goods, etc., that *Brown Company has doubled its production of SOLKA-FLOC.*

Why not find out more about its use in processing? It could mean a better product, bigger profits for you. Write Technical Service, Dept. DF4, at Boston, for recommendations and samples.

BROWN QUALITY COMPANY, Berlin, New Hampshire
CORPORATION, La Tuque, Quebec

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SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS
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The problem of obtaining enough metal chemical containers to avoid shipping delays has become acute

THE PROMPT RETURN of our empty drums will relieve the situation substantially . . . will help to keep the flow of chemicals moving to you.

Every drum of Shell chemicals now carries self-addressed return markings. You simply have your delivery agent pick up the drum when empty and return it to the address on the label . . . freight collect.

Return your empties . . . you'll get your chemicals quicker.

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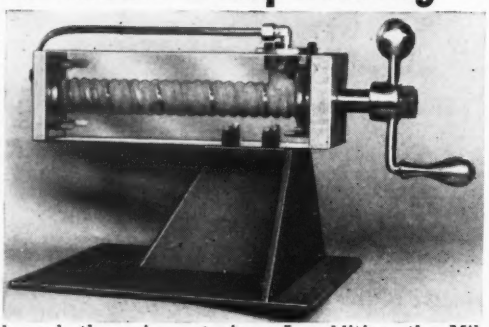
RUBBER & PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO NRM REDUCE YOUR COSTS

MIL-STRAINER LAUDED

At Recent Akron Rubber Group Meeting



NRM's new Mil-Strainer received favorable comment at the recent well-attended, meeting of the Akron Rubber Group. During the informative symposium on reclaimed rubber, one member of the panel of experts in the field reported excellent results with the initial use of the new machine.

Pointing out that his use of the Mil-Strainer was still in its early stages, this reclaimer reported substantial improvements in the quality and uniformity of rubber obtained through the unique strainer. In addition, the Mil-Strainer increased overall operating efficiency, eliminated several other pieces of equipment, and put his process on a semi-automatic, rather than "batch" basis.

Following the symposium, considerable interest was created by the small, transparent, plastic model of the Mil-Strainer on display in NRM's hospitality room. With this model, interested engineers and compounders could actually see the unusual mixing and forwarding action obtained in the Mil-Strainer by the fluted cylinder liner. The flutes have a helix angle which reverses the flow of the material being processed and causes constant shearing and recirculation. A flared head feed screw increases strainer capacity by eliminating "dead spots" and by positively and uniformly distributing and forwarding the compound over the entire strainer plate area.

In addition to reclaimed rubber, the Mil-Strainer can be used to advantage in the refining and mixing of other types of stocks. Why not write for more information today?

APPROXIMATE CAPACITIES FOR NRM EXTRUDERS

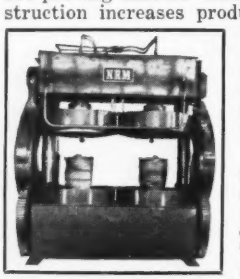
To serve as a guide in the selection of the right extruder for a specific production job, NRM engineers recently released the following "through-put" figures:

Extruder Size	Average Capacity Pounds Per Hour	Average Die Cross Section
2½	200/250	.60 sq. in.
3½	450/500	1.50 sq. in.
4½	1100/1200	2.50 sq. in.
6	2400/2600	5.00 sq. in.
8	4700/4800	9.00 sq. in.
10	6800/7000	14.00 sq. in.

Attention is called to the fact that the figures given are conservative averages and vary according to compound plasticity, temperature of the feed stock, size of the feed strip, screw speed, die design, specific gravity of the stock and many other factors.

"Straight-Line" Principle Of Autoform Press Lowers Maintenance

Full production runs on the latest model of NRM's Autoform Vulcanizer are proving that its "straight-line" construction increases production and decreases maintenance as compared to other fully automatic tire vulcanizers.



The Autoform shapes, cures, and strips a tire in one operation. The casing is placed in the center of the mold. As the upper platen moves down, the air bag enters the casing from the base of the vulcanizer through the lower platen. The tire is shaped and cured. After curing the air bag is retracted into the base, leaving the cured tire in the upper half of the mold from which it is ejected by a power-operated bead ring. Then, it is removed by the operator.

By keeping the movement of the upper platen in a vertical plane, NRM engineers have minimized the number of moving parts and, thus, reduced the points of wear and maintenance.

Other exclusive Autoform features include complete retraction of the air bag into the base for easier loading and unloading, floating of the air bag for accurate bead positioning, and location of the fixed lower platen at a more convenient height for greater freedom, ease, and safety of operation.

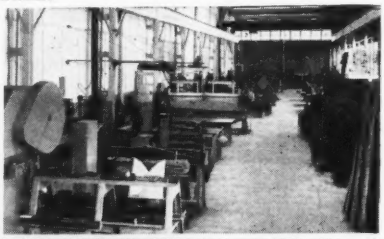
For more tires at less cost, learn more about the Autoform, today!

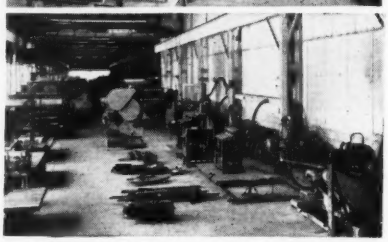
STEEL FABRICATION SHOP ADDED AT COLUMBIANA

Keeping pace with the latest advances in the manufacturing of rubber and plastics equipment, NRM recently put into operation a large, modern steel fabrication shop at its Columbiana, Ohio plant.

Totalling almost 20,000 square feet, the new plant addition houses the most up-to-date equipment for the cutting, forming, treating and welding of steel and other metals in their various forms.

With these new facilities, NRM is now in a better position to meet the greatly increased demand for its high quality rubber and plastics processing equipment. The very latest developments in machinery construction and fabrication can now be used to produce the best equipment on a faster, more economical basis.





NATIONAL RUBBER MACHINERY CO.

General Offices & Engineering Laboratories
Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
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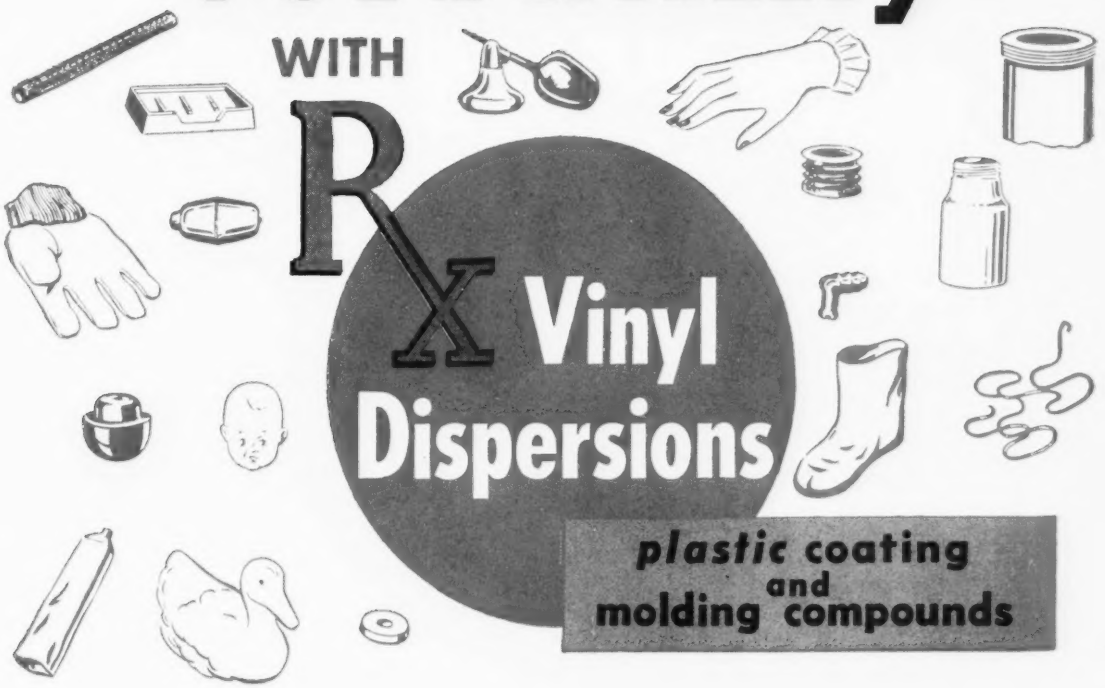
Rx Vinyl Dispersions

plastic coating and molding compounds



The Plastics Industry is rapidly discovering that vinyl dispersion compounds lend themselves to the development of many new products. They are versatile and can be used both as coatings and molding compounds.

The wide range of applications are illustrated by the diversity of uses such as coatings on wire and wire formed objects, cloth coatings, glove coatings, and coatings for metal furniture; to molded objects, such as dolls and doll parts, atomizer bulbs, mannequin parts, electrical parts and many others.

The Watson-Standard Company offers five different types of vinyl dispersions for a wide variety of applications:

PLASTISOLS: Vinyl Resins dispersed in plasticizers—considered 100% solids—no volatile material—used both as coating and molding compound—for example, doll and doll parts, or textile coatings.

FOAMOSOLS: Plastisol type incorporating a blowing agent—requires no external pressure for foaming—for use as shock absorption parts, or textile coatings.

RIGIDSOLS: Special type of plastisol, of low viscosity but with high degree of rigidity, excellent for molding objects where toughness and resiliency are desired and still retain their rigidity.

PLASTIGELS: Gelled vinyl plastisols—Plastigels may be extruded, calendared, molded, spread or embossed, all of which have excellent retention of detail out of mold and retain their shape during fusion.

ORGANOSOLS: Vinyl Resins dispersed in a combination of plasticizers and organic solvent, principally used as a coating, such as coating for textiles, or wire-like objects.

• *Write for your copies of our Technical Papers "Vinyl Organosol and Plastisol Dispersions" and "Slush Moldings."*

Watson-Standard CO.

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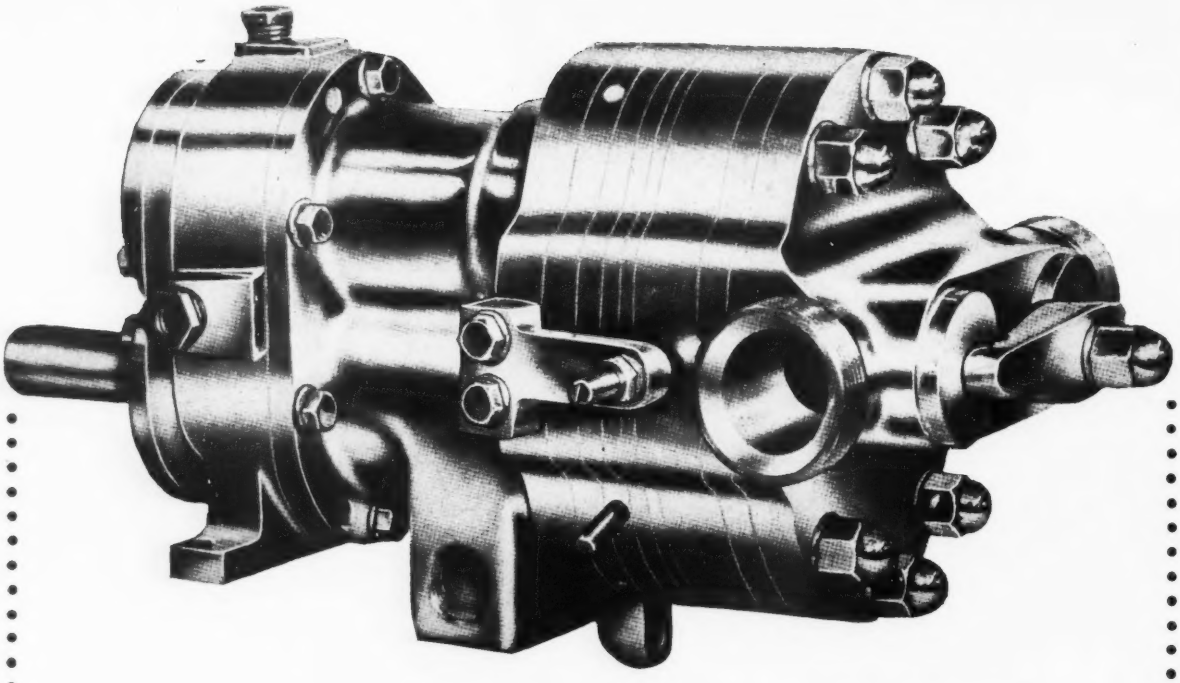

FLOW-MASTER

is the answer to your
LATEX PUMPING PROBLEM

Flow-Master latex pumps are presently operating, pumping and metering latex twenty-four hours a day without the necessity of disassembling for many days.

Pumping and metering natural, GR-S, Neoprene and other latex compounds no longer presents a problem.

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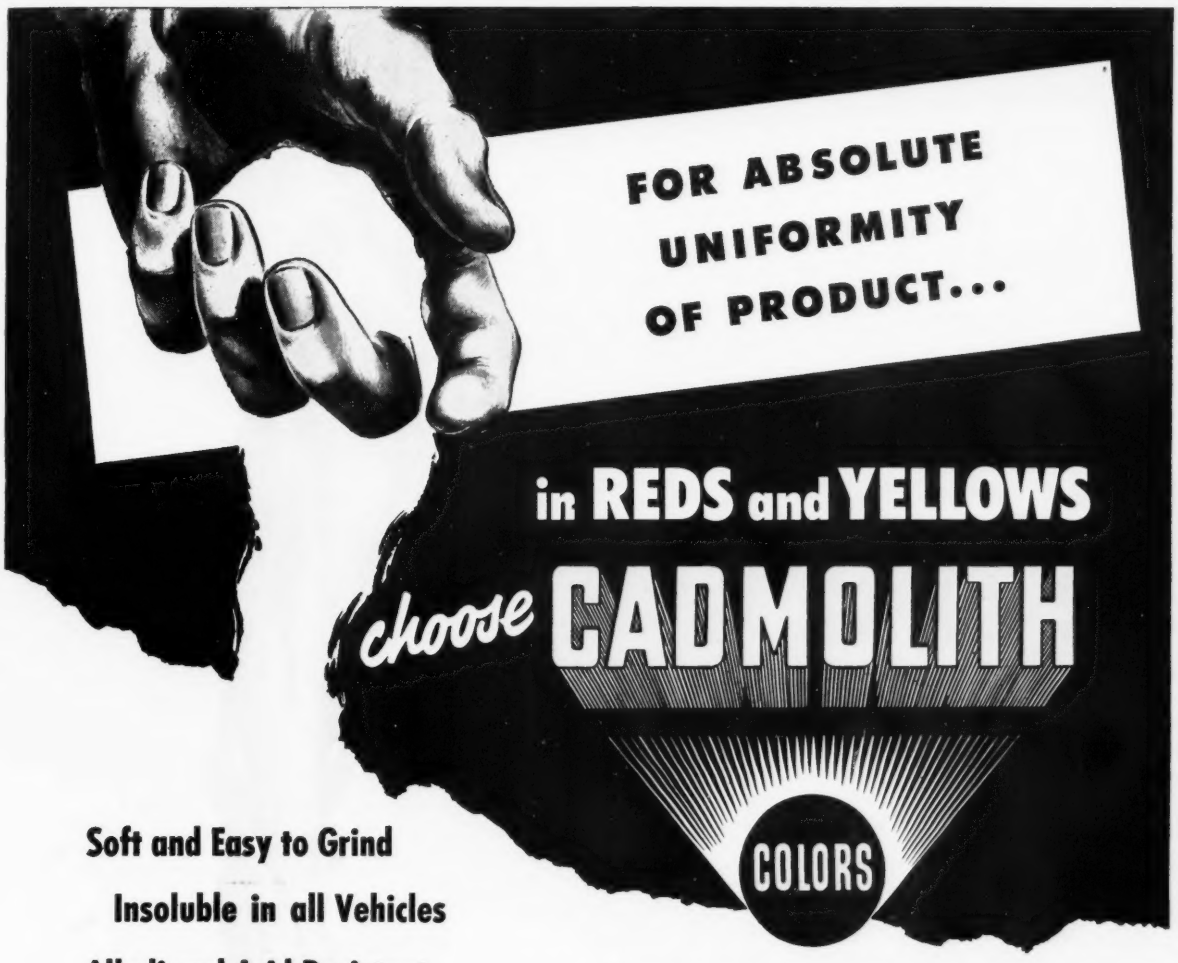

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Glidden leadership in pigment research has produced in Cadmolith* Colors the very finest reds and yellows available anywhere—measured by every standard of importance to manufacturers of all types of rubber products.

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Send for Folder giving complete details, with color chips. Write The Glidden Company, Chemical and Pigment Company Division, Union Commerce Bldg., Cleveland 14, Ohio.

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SUNOLITH* Lithopone

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PREVENT SCORCH!

END BIN SET-UP!

IN NEOPRENE STOCKS WITH

SUBLAC PX-5

At last the rubber industry has an answer to the costly problems of set-up in bin storage and scorch in neoprene compounds. It's SUBLAC PX-5, an oil resistant, light colored, powdered resin.

Actual production experience has proved that only 10 parts of SUBLAC PX-5 on the rubber acts as a co-accelerator in all non-black neoprene stocks and prevents scorch in both process and bin storage stocks.

In addition, this amazing new material . . . SUBLAC PX-5 . . . gives a preservative quality to unvulcanized neoprene stocks and improves their physicals.

Performs Equally Well In Natural and GR-S Stocks!

Versatile SUBLAC PX-5 eliminates the need for zinc oxide and accelerators in using basic fillers (Silene, whiting, etc.). For example, here is a typical formula and test results after a 10 minute cure at 325° F.

Formulation #83		*Test Results*	
GRS (X631)	100	Tensile psi.	1200
Sulfur	3	Elongation %	250
Silene EF	75	Modulus @ 200%	990
Neozone D	1	Hardness	88
SUBLAC PX-5	30		
POLYMEL C-130	7.50		

TEST SUBLAC PX-5 YOURSELF, FREE!

Write today for 5 lb. sample and test data. Once you've tried SUBLAC PX-5 in your stock you'll agree it's the biggest development yet in modern rubber processing.

Also Ask About These Quality Polymel Products:

GILSOWAX (solid)—Extender, Wire Compounds
SUBLAC RESINS (powders)—Hardeners, Stiffeners
POLYMEL 6 (solid)—Tires, Camelback
POLYMEL 7 (liquid)—Tires, Camelback, Carcass
POLYMEL D (solid)—Polystyrene-Indene Plasticizer
POLYMEL C-130 (solid)—Plasticizer
D-TAC (solid)—Non-coloring Detackifier

THE POLYMEL CORP.

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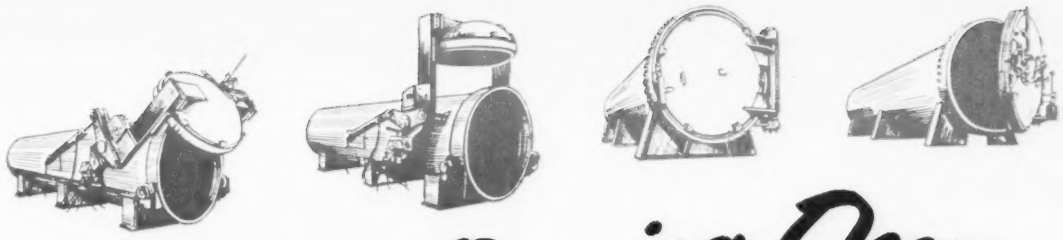
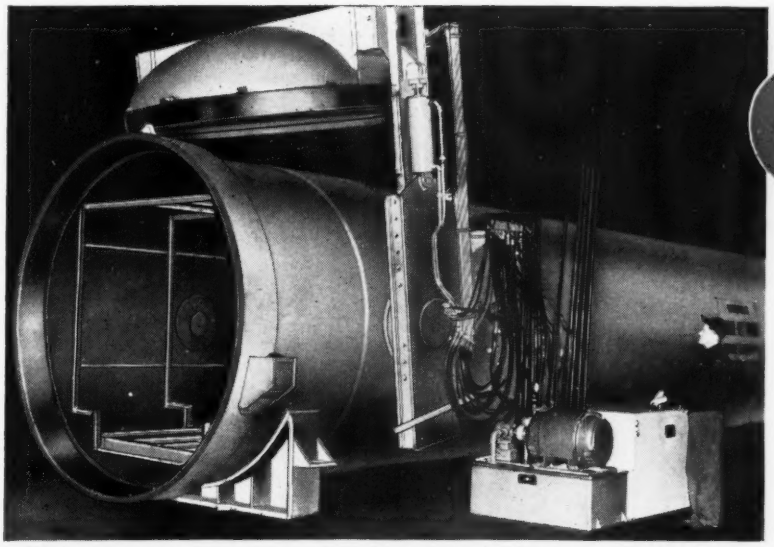
Phone: PLaza 1240

Representatives: Eastern—H. M. Royal, Inc., Trenton, N. J. Western—Merit-Western Co., Los Angeles, Calif.

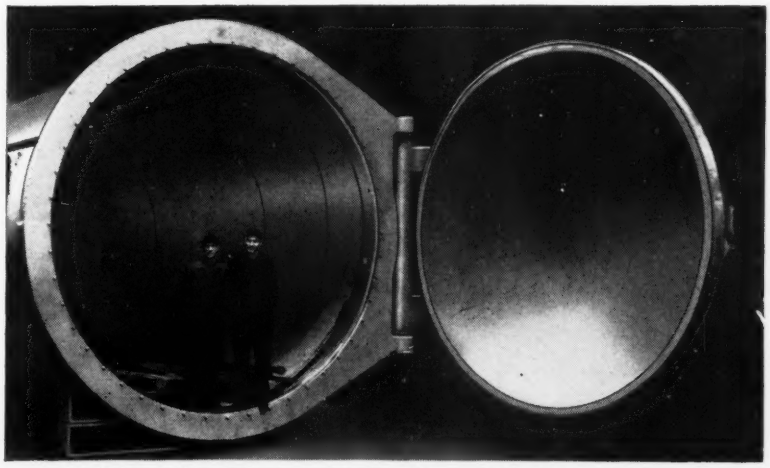


Quick Opening Doors

TO MEET ALL CODE REQUIREMENTS FOR PRESSURE OR VACUUM



10'0" Dia. x 75' Lg. Autoclave, with overhead hydraulically-operated Quick Opening Door with automatic safety features, and for manual or automatic valve operation



12' Dia. x 28' Lg. Vulcanizer, with manually operated Quick Opening Door.

Struthers Wells

All Welded Design, for Manual or Hydraulic Operation

Designed for the ultimate in simplicity of operation for pressure or vacuum vessels, or a combination of both. SWC Quick Opening Doors make possible easier handling, faster opening and closing, and a lifetime of reliability.

Doors can be furnished in the conventional hinged type, or for opening overhead, as illustrated.

The hinged door, manually operated, is mounted on anti-friction bearings requiring a minimum of effort for opening or closing.

The overhead door, which is hydraulically operated throughout, offers the additional advantage of substantial savings in floor space. This door can be provided with controls for complete automatic operation, or with manually operated hydraulic valves for semi-automatic operation. In either case, safety features are incorporated in the hydraulic circuit.

All doors are held in the closed position by a patented locking ring which requires no bolts. The locking ring is actuated by means of a hydraulic cylinder expanding the ring into the door frame groove for locking, and contracting the ring to open the door.

For complete description, write for our bulletin T-1200.

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WHAT SILICA CHEMISTRY OFFERS

Du Pont "Ludox" colloidal silica improves

No matter what type of latex products you make, there are opportunities for the silica chemistry of Du Pont "Ludox" to help you expand your markets.

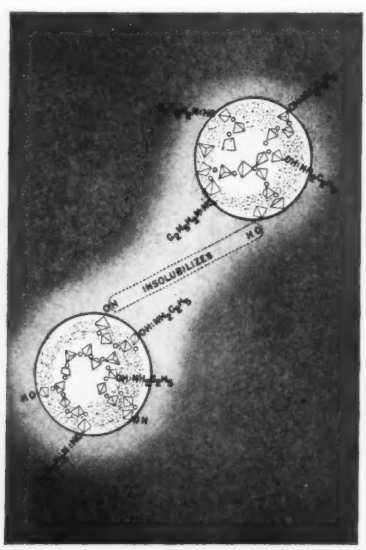
In latex-dipped goods, coatings and adhesives, "Ludox" colloidal silica increases stiffness, toughness and water resistance . . . decreases tackiness, improves adhesion. And this unique combination of properties is not found in any conventional latex additive. You will want to investigate all the advantages "Ludox" can give you by filling in and returning the coupon today.

"Ludox" is a 30% colloidal solution of almost pure amorphous silica particles. The electron photomicrograph shows fineness and uniformity of the "Ludox" particles—magnification, 25,000X. The average particle size of 17 millimicrons is below the range of the best carbon blacks.

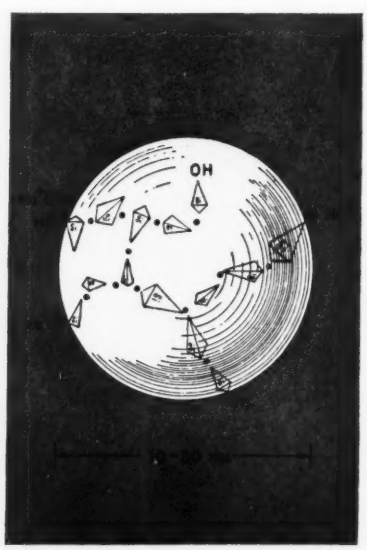
Surface hydroxyl groups on a "Ludox" micelle are shown in the diagram. These groups make the particles chemically reactive in contrast to commonly used dry fillers. This reactivity has led to many unusual properties and uses for "Ludox" in the latex field.

Typical "Ludox" reaction with ethyl amine is also shown below. This is useful in the stabilization of some latices containing "Ludox."

"Ludox" particles at 25,000 magnification.



Reaction with monoethylamine.



Structure of "Ludox" particles showing surface hydroxyl groups.

THE LATEX FORMULATOR

latex-dipped goods, coatings, adhesives

INCREASES STIFFNESS. Example: Seven parts of Du Pont "Ludox" colloidal silica solids per 100 parts neoprene latex produced a thread with nearly doubled modulus over the entire range of elongation. Similarly, increased modulus is obtained in natural rubber films.

INCREASES TOUGHNESS. Example: "Ludox" improved adhesion, stopped flaking from neoprene-coated belting. In a paper saturant, abrasion resistance was increased 20 to 40%.

IMPROVES ADHESION. Example: Doubled leather-to-leather adhesion by adding 20 parts of "Ludox" solids per hundred parts of natural rubber latex solids. This effect has also led to use in GRS and neoprene latex adhesives and coatings.

DECREASES TACKINESS. Example: Eliminated surface tack from uncured Buna N solvent coating on cloth. "Ludox" works equally well whether applied as an aftercoat or incorporated in the latex.

INCREASES WATER RESISTANCE. Example: Exceptional increase in water resistance or decrease in water swelling has been obtained with 20 parts "Ludox" solids per 100 parts neoprene latex solids.

DECREASES RUBBER SOLIDS. Example: In neoprene foam, 5 parts of "Ludox" solids per 100 parts of dry neoprene, Type 601, required about 20% less solids to obtain a given modulus than foam without "Ludox." A considerable saving without affecting flex life, bend flex or compression set.

Notice that "Ludox" gives combinations of properties that are difficult to achieve by any other method. And a little "Ludox" goes a long way.

SEND FOR THE "LUDOX" LATEX BULLETIN

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department, Wilmington, Delaware.

*Name*_____ *Title*_____

*Company*_____

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any mill condition and any stock condition can be duplicated, to determine:

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3. Air flow data
4. Required temperatures
5. Required heating surface
6. Dryer length and design
7. Apron or roller (feeding) speed
8. Exact development of drying curves required.
9. Possible simple changes in stock preparation prior to drying, to attain maximum quality and efficiency.
10. Controls required to maintain quality and quantity drying in uniform, continuous production.

CONSULT THE EXPERTS

C. G. SARGENT'S SONS Drying Research Laboratory for Industry is staffed by men who KNOW their jobs. They have the mental curiosity of the true scientist combined with the dollars and cents, how-can-it-be-done-to-keep-quality-up-and-cost-down outlook of experienced mill men. Here is an invaluable source of experience and knowledge, to serve you and your industry. Wherever a drying process occurs, from food to plastic, textiles to rubber, paper to paint, SARGENT'S Drying Research Laboratory is highly qualified to serve, advise, recommend, and design special drying equipment.

Bring us your drying problems — the more difficult they are, the better we like them!

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zinc oxide

An easy processing zinc oxide. Uniform particle size and absence of extreme "fines" assures good dispersion in rubber.

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zinc oxides for every rubber need

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COLUMBUS, O. CHICAGO

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The rubber market's **growing!**

MAKE YOUR SALES GROW, TOO... WITH RUBBER PRODUCTS THAT HAVE A SNIFF THAT SELLS

More and more foam and sponge rubber is being used in consumer products . . . pillows, mattresses, seat cushions. And it's a shock to a customer to discover that air pockets in foam rubber are storage spaces for unpleasant odors.

Odor appeal can easily make the important selling difference in your rubber products. And it's easy to give them the sniff that sells with "Alamask" odorants.

Special note to Latex manufacturers... Du Pont "Alamask" Odorants are now available in water dispersible form.

Send today for your copy of our new booklet *Du Pont "Alamask" Odorants for the Rubber Industry* ... or let us give you a recommendation for your rubber odor problem. Write E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Aromatics Section, Wilmington 98, Delaware. Branch Offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

Du Pont **Alamask** Odorants

TRADEMARK

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Highlights in the history of Rubber Processing

1906 First organic accelerator

1924 First U. S. patent on the use of age resistors

1925 Mercaptobenzothiazole (MBT)

1935 First catalytic plasticizer

1946 Calco developed the first commercial catalytic plasticizer free from toxic effects and objectionable odor: PEPTON® 22 Plasticizer

1947 Reinforcing furnace blacks became commercially available

1950 ANTIOXIDANT 2246* — the most active non-staining, non-discoloring antioxidant ever developed. A product of Calco

1951 ANOTHER STEP FORWARD... Calco introduces an important new product to the Rubber Industry...

NOBS No. 1, the outstanding delayed-action accelerator for natural, synthetic and reclaimed rubber. It is ideal for use with reinforcing furnace blacks in up-to-date tire-compounding. No special handling is required.

Calco®

*Trade-mark

AMERICAN Cyanamid COMPANY
CALCO CHEMICAL DIVISION
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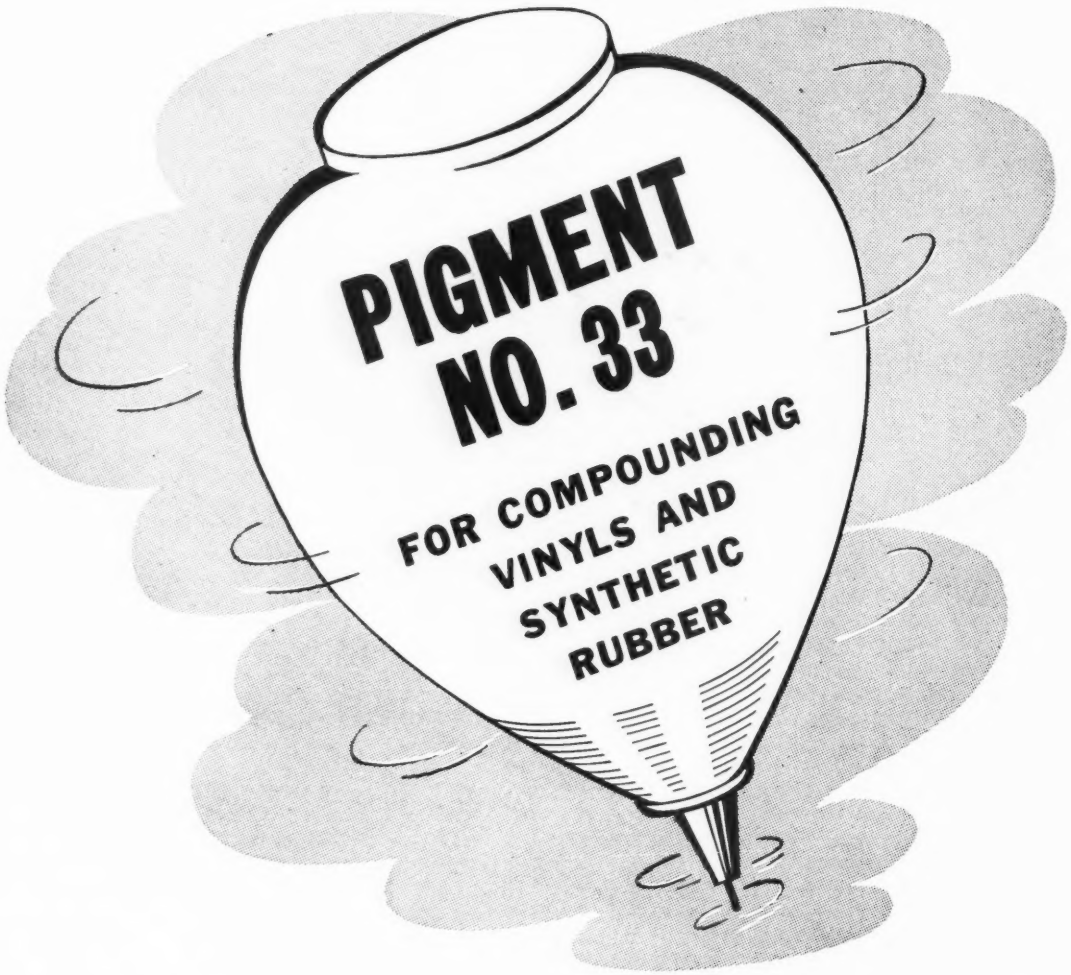
IT'S "TOPS"



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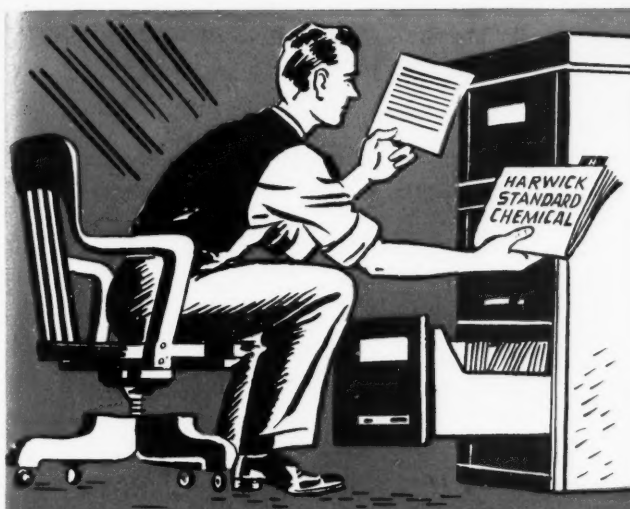

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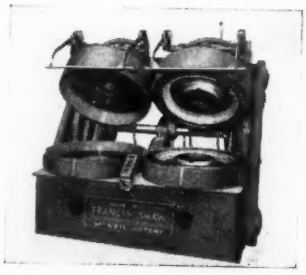

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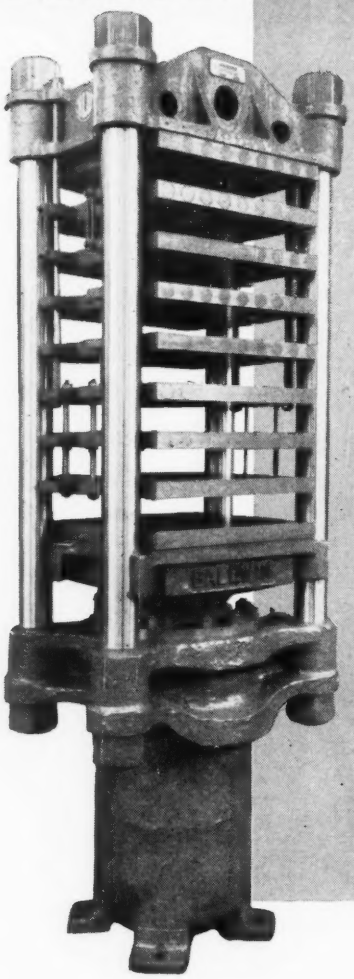

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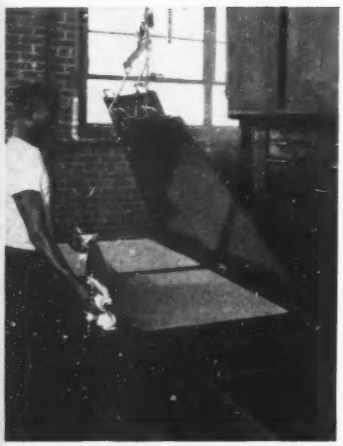

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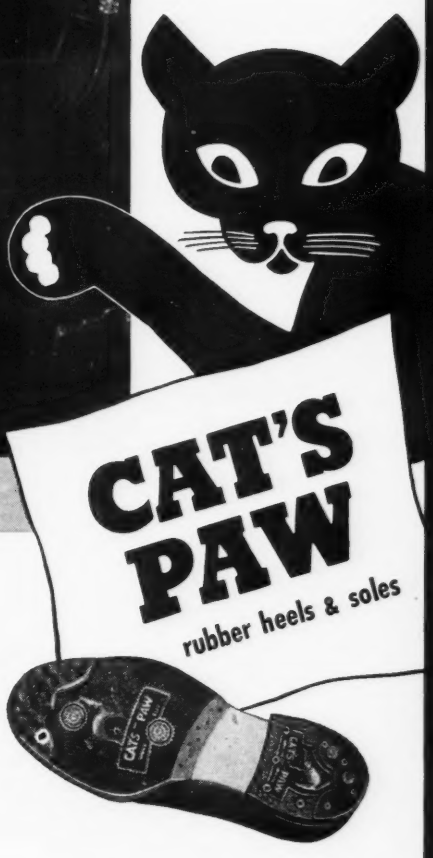

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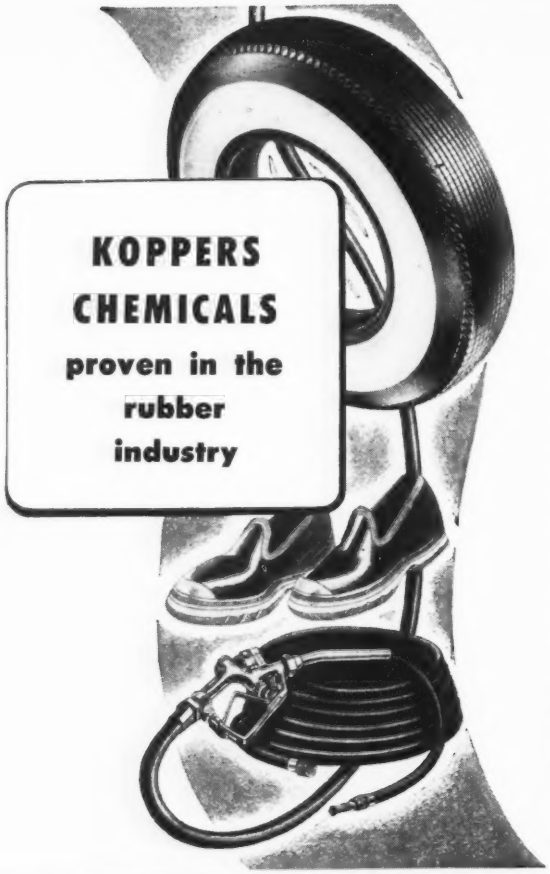

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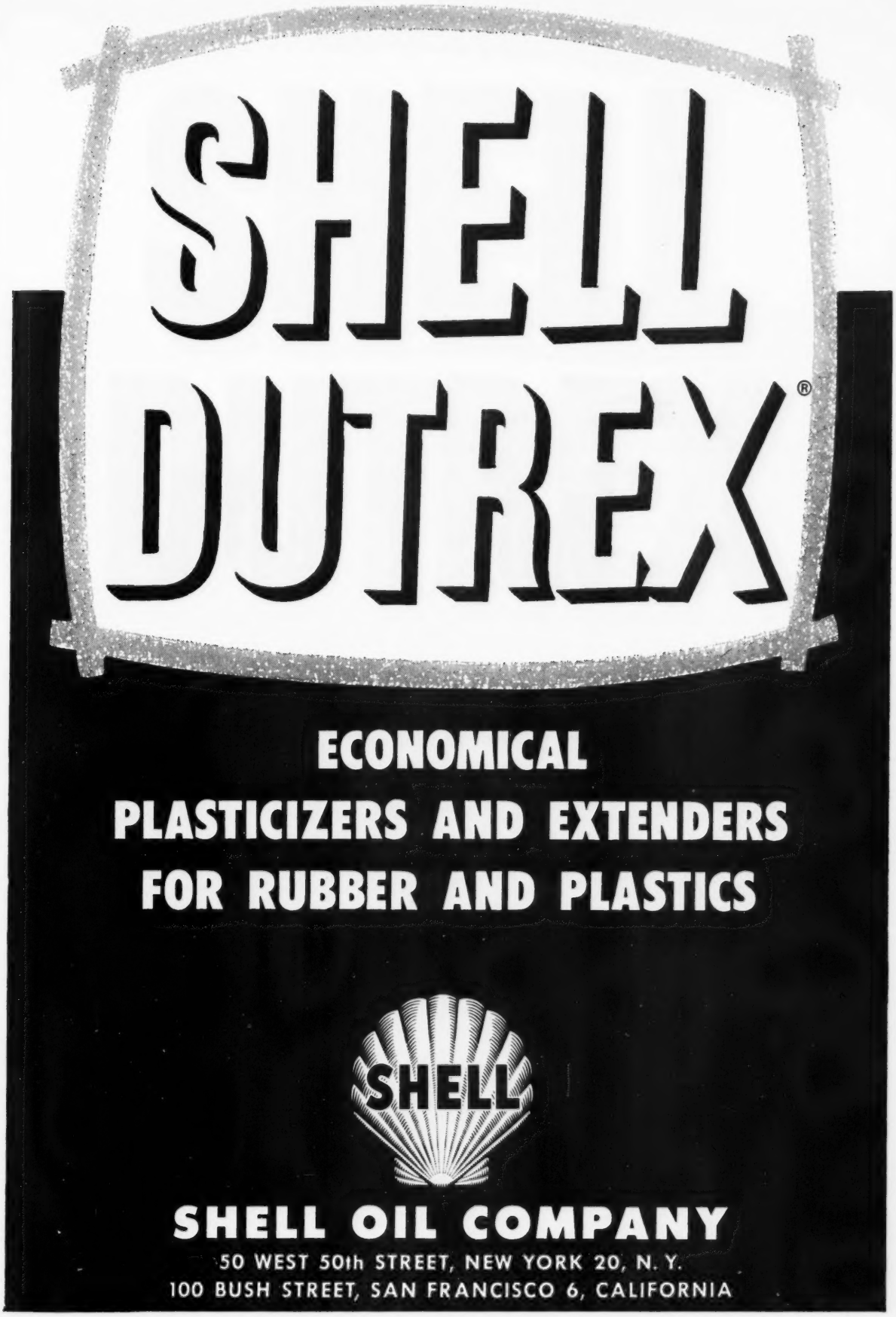
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VOL. 126.—NO. 1 APRIL, 1952

The Meaning of Terms Related to Curing[1]

J. W. Schade[2]

A COMMENDABLE effort to do something about standardizing the definitions of terms relating to the vulcanization of rubber has been made in this paper. The author has used data obtained with the National Bureau of Standards strain tester and the mathematical relation discovered between time of cure and the elongation of a test strip under specified load to develop a method for determining equivalent states of cure. More complete details of the author's method were published in the December, 1950, issue of India RUBBER WORLD.

Some acceptance of these definitions has been obtained in the rubber industry, and in view of the very great importance of their standardization to all industry technologists, it is recommended that the definitions and the method used in their development be examined carefully by Committee D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials as well as by all other interested technologists in the industry. EDITOR.

ANYONE unfamiliar with rubber technology would naturally assume that the terms used in describing vulcanization convey the same concepts to all technologists in the industry. This is not the case. For example, the term optimum cure is variously defined, and compounders utilize a variety of methods for selecting optimum cures. Some technologists rely mainly on the shape of the modulus-time curve; others include tensile strength values in their analysis; and still others depend upon sensory indications, such as resistance to tearing by hand, before choosing an optimum. That there is no common basis for selecting optimum cures from moduli, tensile strengths, and ultimate elongations of a series of five cures ranging from 30 to 150 minutes was clearly demonstrated some years ago. Data of this kind were obtained for specimens of GR-S supplied by the 15 GR-S plants then operating. These data were presented to six technologists employed in the larger rubber companies and at the Government Laboratories with a request that they select the optimum cures for the specimens. In one company the estimates of four technologists were averaged; in another company two estimates were considered. The differences in optimum cures selected by the technologists for the 15 specimens varied from 15 to 45 minutes, with an average difference of 28 minutes.

If the values selected for optimum cure of the 15 specimens had been such as to indicate agreement on a common basis for selecting optimum cure, a great variation among the commercial GR-S produced by the 15 plants at that time would have been evidenced. The values reported from identical data varied, however, for the different specimens over a range of 10 to 40 minutes. These results show that the compounders could not have used a common method of selecting the optimum cures.

The term optimum cure obviously meant different intervals to the technologists who analyzed the data. Furthermore discussions at various meetings of technical men have disclosed that concepts of the meaning of rate of cure and of state of cure also differed materially. Therefore an attempt at logical definitions of terms seems desirable.

Vulcanization

Vulcanization was first defined by changes in the physical properties of rubber compositions induced by a chemical reaction. Charles Goodyear listed a number of changes produced by his process of heating mixtures of "gum elastic" and sulfur. The properties exhibited by unvulcanized material which he stated were changed by his process were stiffening and becoming rigid and inflexible during cold weather, softening and decomposing in warm sunlight, dissolving in grease or oils, adherence of two surfaces when pressed together, and loss of elasticity by continued tension or constant use.

Ingredients other than sulfur were later shown to produce similar physical changes in rubber, but to the present day vulcanization of rubber, synthetic as well as natural, as practiced commercially, is conducted predominantly by heating mixtures containing sulfur. Also today the degree of cure is judged by quantitative changes in physical properties. For the purposes of this discussion, then, vulcanization may be considered as the

[1] The work reported herein was carried out under the sponsorship of the Synthetic Rubber Division, Reconstruction Finance Corp., in connection with the government synthetic rubber program.
[2] Manager, Government Laboratories, University of Akron, Akron, O.

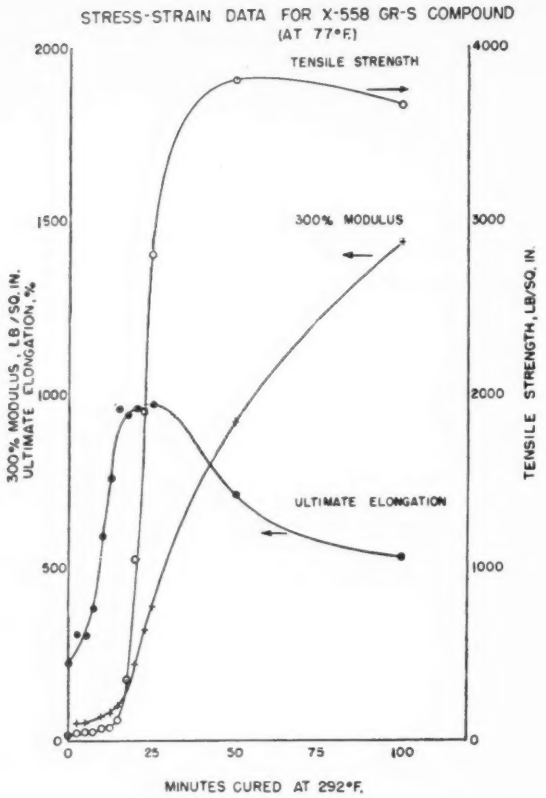


Fig. 1. Changes Produced by Vulcanization with Respect to Modulus, Tensile Strength, and Ultimate Elongation of a GR-S Composition

process of thus changing rubber compositions from relatively weak, plastic, inextensible material, soluble in hydrocarbons, into strong, elastic, extensible, insoluble materials. In addition to sulfur, for most vulcanizable compositions of natural or analogous synthetic rubbers, zinc oxide, accelerator, and organic acid were added to regulate the rate and degree of change in properties. To elicit the best properties of GR-S synthetic rubbers, carbon black is also added. The changes produced by vulcanization with respect to modulus, tensile strength, and ultimate elongation of a GR-S composition are illustrated in Figure 1.

State of Cure

When a rubber composition containing sulfur is heated, chemical reaction occurs between the sulfur and the rubber hydrocarbon. The sulfur combines at a uniform rate until most of it has reacted. Concurrently with the chemical reaction profound changes in physical properties are observed. The physical changes for each compound are related to the amount of combined sulfur, but changes in combined sulfur and variations in physical properties are not in direct proportion. Unlike the amount of combined sulfur, none of the properties plotted in Figure 1 changes at a uniform rate for any extended time interval. State of cure is usually determined by one of various methods based on changes in physical properties such as those plotted in Figure 1.

Apparently no simple equation would relate the measure of any of these properties with the time of vulcanization. However another property, elongation under constant load, can be rather simply related to time of cure.

If elongations of test strips representing a series of cures are measured under constant load (strain tests), they are found to decrease with increased time of cure. In contrast to the curves representing other properties (Figure 1), these constant-load elongations bear a simple mathematical relation to the times of cure, which is expressed by the equation[3, 4]

$$(t_x - t_o)\,(E_x - E\infty) = \frac{1}{k} \qquad (1)$$

where t_x represents any time of cure, E_x represents the corresponding elongation, t_o and $E\infty$ are constants characteristic of each compound.

In graphic presentation such an equation traces an hyperbola, as illustrated in Figure 2, when the time and elongation units are of equal length.

Furthermore the *rate* of change in elongation per unit of curing time is expressed by the equation.[4]

$$\frac{dE}{dt} = \frac{-1/k}{(t_x - t_o)^2} \qquad (2)$$

Obviously, as the time of cure is increased, the value of dE/dt decreases (Figure 2), and the value of dE/dt at any point on the hyperbola is a measure of the state of cure at that point in contrast to values of dE/dt for all other points on the curve. The ratio of dE/dt at any point is the value of the corresponding tangent to the hyperbola. The negative sign indicates a negative slope of the tangent, the numerical value of which decreases with increasing time.

[3] F. L. Roth and R. D. Stiehler, private communication regarding strain test to Synthetic Rubber Division, RFC.
[4] J. W. Schade, India RUBBER WORLD, Dec., 1950, p. 311.

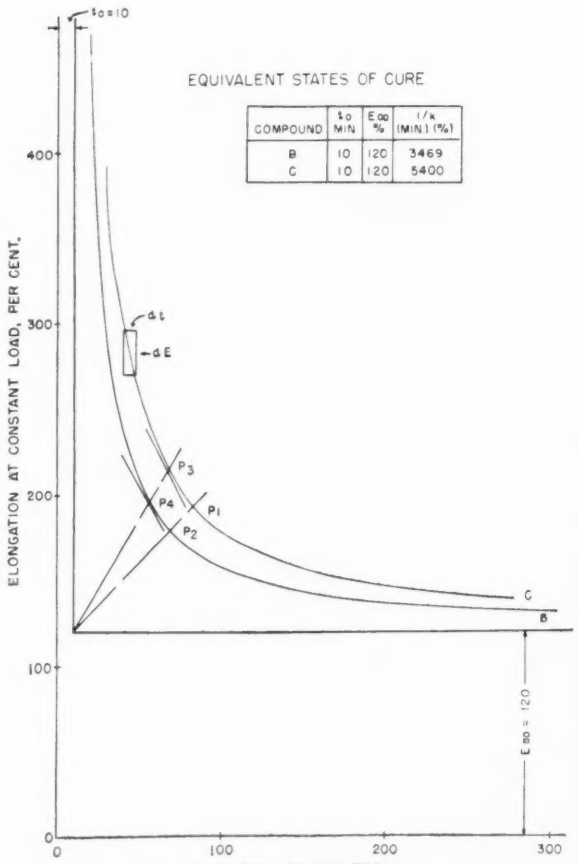


Fig. 2. Elongation at Constant Load (Strain Test) vs. Time of Cure in Minutes for Compounds B and C

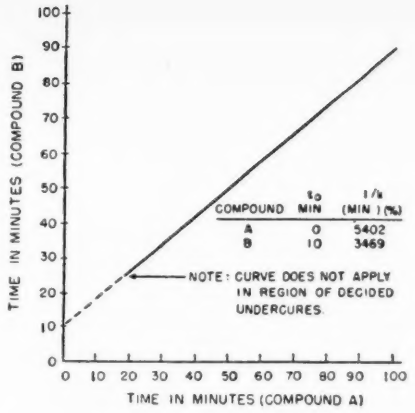


Fig. 3. Linear Relation between Curing Time in Minutes for Compounds A and B

All hyperbolas corresponding to equation (1) extend from infinite elongation at time t_o to elongation $E\infty$ at infinite time. The values of dE/dt decrease from infinity to zero between these extremes. Fractional distances between the extremes may be identified by the slopes of tangents to the curve, the dE/dt values. Thus at 45 degrees on *all* hyperbolas, the rate of change in elongation is one percentage unit per minute of cure, and the curing process has proceeded halfway from infinite elongation ($t_x = t_o$) to infinite curing time. It is postulated that at any selected slope the same state (degree) of cure is attained for all compounds, as illustrated in Figure 2. At points P_1 and P_2, compounds C and B are at the same state of cure (the halfway point) inasmuch as the slope of tangents to the curves at these points is the same. Similarly at points P_3 and P_4 another equivalent state of cure is attained by both compounds.

Undoubtedly some compounds will fail to yield values consistent with this postulate. In some instances, by reducing the constant load or lowering the temperature of cure below a certain critical point, values may be obtained which will conform to the typical equation. Whatever the limitations, experience has shown that the mathematical calculations will yield reliable and significant data for many compositions.

Regardless of the particular property selected for tracing the changes produced by increasing the time of heating, each composition progresses from the *uncured* state through a region of *undercures*, then through a narrow range of *good cures*, and finally into the region of *overcures*. In the range of good cures is, theoretically, a *best or "optimum" cure*. These terms are the usual ones used in describing the state of cure. The degree of ovrcure or undercure depends on how greatly the time of cure differs from the optimum, but there is no commonly accepted quantitative measure of the degree of under- or of overcuring.

As Whitby stated in 1920,[5] "The term 'state of cure' is intended to indicate the position of a cure in a series of progressive cures."

Times for Equivalent Cure

Usually the expression "times for equivalent cure" refers to the times required to bring compounds to an equally serviceable state of cure. Since there is no recognized scale for measuring undercure or overcure, it is not possible by examination of the usual stress-strain data to compare compounds at any state of cure other than their optimums. By means of strain data, however, it is possible to measure the degree of cure and to calculate the times for equivalent cure corresponding to any selected state.

If, as postulated, equal rates of change in strain are the criteria of equal states of cure, the relative times required to bring two compounds to any selected state of cure may be calculated according to the equation[4]

$$(t_x)_1 = (t_o)_1 + (t_x)_2 \sqrt{k_2/k_1} - (t_o)_2 \sqrt{k_2/k_1} \quad (3)$$

where the subscripts, 1 and 2, represent respective values for two different compound. The linear time relation is shown in Figure 3. Here the criterion is any selected value of dE/dt.

A line drawn at a 45-degree angle from the origin will intersect the curve at the point representing equal states of cure at the same time of cure. This state of cure is not necessarily a useful or desirable one.

Figure 4 presents the relative curing times in another way. Here time of cure is plotted against state of cure, as represented by values of dE/dt.

The relative times on the two curves corresponding to the points of intersection of a line representing any selected value of dE/dt are the times for equivalent cure at that value of dE/dt. Note that compound A attains the rate dE/dt = 1.25 sooner than compound B, but requires a longer time to attain the rate dE/dt = 2.75.

Optimum Cure

The term "optimum cure" (the best in the range of *good* cures) conveys different meanings to different technologists; it has been variously defined.[6] The most generally recognized criteria for selecting optimum cures of natural rubber were:

1. Maximum tensile strength. This was probably the one most commonly accepted for many years.
2. Maximum tensile product (maximum tensile strength multiplied by the corresponding ultimate elongation), advocated by Wiegand.[6] Tensile products approximate the relative energies required to rupture the test strips. Maximum energy of rupture is probably the best criterion for selecting optimum cure, although its determination is rather tedious Wiegand referred to the "old fashioned method" based on tensile strength, breaking elongation, and permanent set (presumably with the objec-

[5] G. S. Whitby, "Plantation Rubber and the Testing of Rubber," pp. 320, 340. Longmans, Green & Co., London and New York (1920).
[6] J. S. Scott, "Some Observations on Rubber Testing." *India Rubber J.* 86, 593 (1933).

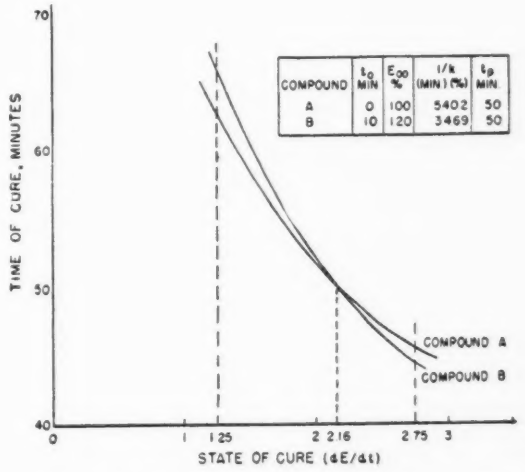


Fig. 4. Time of Cure *vs.* State of Cure for Compounds A and B

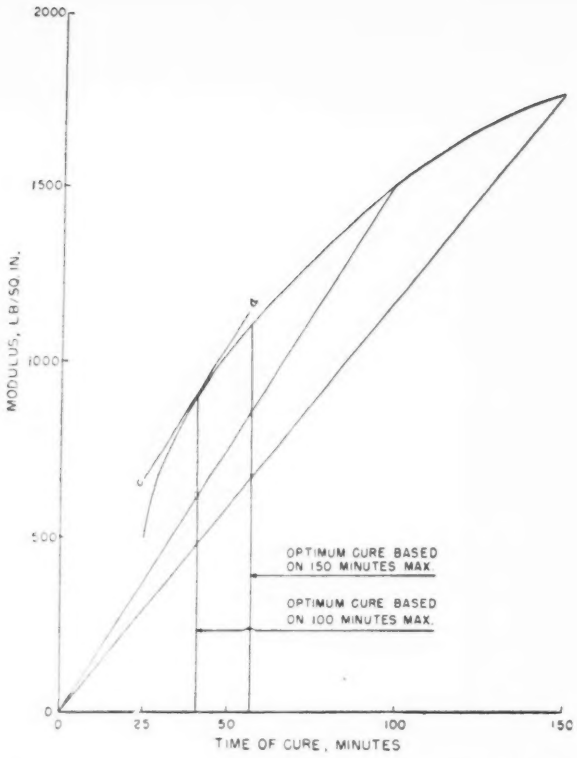


Fig. 5. Selection of Optimum Cure Time (Modulus Method)

tive of high values for the first two and low values for set).

3. The best compromise among high tensile strength, high modulus, and low permanent set (after constant elongation). This method was adopted for natural rubber by the Research Association of British Rubber Manufacturers.

4. The best compromise between high tear resistance and high "stiffness index"[7] (a form of rigidity measurement) both before and after one year's aging.

5. In 1939, in summarizing a discussion on "What is optimum cure and how should it be determined" held at a general meeting of the sections of the India Rubber Institute of Great Britain, F. H. Cotton[6] presented the following formula:

$$\text{Optimum cure} = \frac{4T + 2S + M + H}{8}$$

where T represents time for development of best tensile strength, S = time for producing best set, M = time to attain the best modulus value, and H = the time at which the best hardness results.

Obviously, the times selected for optimum cure of natural rubber compounds would not be the same when determined by these various criteria. Moreover, some of the criteria would probably not apply to compounds of synthetic rubber.

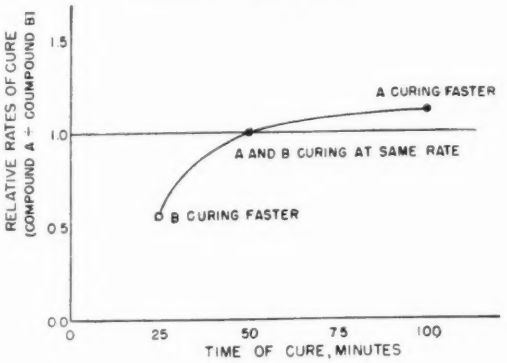
A common method for selecting optimum cure is to plot a modulus-time curve and to select as optimum the time at which the "break in the curve" occurs. No particular method for determining the "break" is generally recognized, and even from the same set of modulus values observers will select rather widely differing optimum curing times. The plan which for some time was the only one followed at the Government Laboratories is illustrated by Figure 5. The line c—d is drawn tangent to the curve and parallel to the line connecting the modulus value for a long cure (100 or 150 minutes) with the origin of the axes.[8]

It has been found that the most consistent results and the values closest to the optimum cures, t_p, selected from strain data are obtained when the line c—d is drawn parallel to the line connecting the 100-minute modulus with the origin of the axes. A perpendicular from the point of tangency to the x-axis indicates the time of optimum cure, about 40 minutes in this example. If the slope of the line from the origin to the 150-minute modulus is used, the optimum cure is quite different, about 15 minutes longer in this case.

The method does not always produce accurate values because of variability in drawing the curves and in selecting the maximum time of cure for determining the slope of the tangent. Essentially, the method consists in finding the point on the curve where the change in modulus per unit of time is the average rate of change from zero to the maximum point selected. Theoretically, the "break in the curve" should be at the point where the radius of curvature is minimum.

Optimum cures may be selected also from strain data. Inasmuch as the relative times for attaining *any* state of cure may be calculated (equation 3), the relative times for attaining optimum cure may be thus selected. To determine the optimum cure of a stock, t_p, the value

Fig. 6a. Time of Cure vs. Relative Rates of Cure, Compound A/Compound B



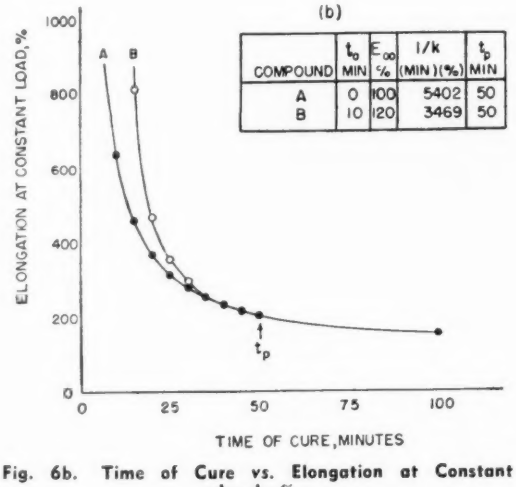


Fig. 6b. Time of Cure vs. Elongation at Constant Load, %

[7] R. P. Dinsmore and A. O. Zimmerman, "Effect of Accelerators on Cure and Quality of Various Rubbers," *Ind. Eng. Chem.*, 18, 144 (1926). These authors define stiffness index as: "A measure of the resistance to stretching of the rubber. For pure gum and sulfur mixes, this property is expressed as the increase in load necessary to change the elongation from 600% to 800%, for accelerated mixes, the load increase from 500% to 700% is used."

[8] R. A. Crawford, private communication regarding optimum time, to Synthetic Rubber Division, RFC.

Also, A. E. Juve and B. S. Garvey, Jr., in "Effect of Time and Temperature of Cure on GR-S Tread Stocks," *Ind. Eng. Chem.*, 36, 212-215 (1944), say: "The inflection point in the modulus-time curve is a reliable indication of equivalent state of cure. It is a fairly sharp point which can readily be determined from stress-strain data."

dE/dt which corresponds to the optimum curing time for some standard compound is selected and substituted, together with the proper t_o and 1/k values, in equation (2) or equation (3) to yield a fourth equation in which the factor, f, equals[4] $\frac{1}{\sqrt{dE/dt}}$ for the selected optimum of the standard compound.

$$t_p = t_o + f\sqrt{1/k} \qquad (4)$$

The value of f may be selected by each technologist on the basis of experience. Once this is selected, however, the corresponding times for optimum cures of other compounds tested under the same conditions may be computed. The value for f proposed by the author of this method is 0.68. Hence the equation becomes

$$t_p = t_o + 0.68\sqrt{1/k}. \qquad (5)$$

The validity of this method has not yet been tested by many compounders, but experience at the Government Laboratories indicates its correctness for a variety of polymers tested in a number of different ways.[9]

It should be emphasized that, in selection of optimum cures by any of the suggested methods, no absolute values for modulus, tensile strength, or other properties are used as criteria. All values are *relative* to similar values produced in the same compound by different periods of vulcanization.

Best Technical Cure

Commercial standards to which stocks for particular types of service must conform, such as minimum values for modulus, tensile strength, and other properties, are set up by compounders. The time required to develop these *specified properties* should lie in the region of good cures, i.e., close to the *optimum curing time* which has been determined without reference to absolute standards of physical properties. If these two times are widely different, changes in the compound should be made either by adjustment of sulfur, accelerator and zinc oxide to alter the optimum curing time or by changing the kind or quantity of compounding ingredients so as to produce the physical properties desired at a cure as close as possible to the optimum time without serious sacrifice of the desired properties.

When the two objectives are attained at the same time, i.e., the nearest approach to the optimum cure and specified properties for the best technical cure, that time would represent the *best technical cure*. Overcuring a compound to attain certain absolute values of properties would result in a material with poor aging characteristics. Some compositions cannot be made to meet at any cure the optimum properties desired for a specific service.

As Crawford[8] has pointed out, "A well-balanced compound will have an 'optimum cure range'"—i.e., centered about the best (optimum) technical cure—"in which properties of the cured stock change very little, so that, in commercial operations, reasonable unavoidable variations in time of cure will not affect the quality of the stock."

To illustrate, a compound whose modulus-time curve is flat in the region of the best technical cure is more desirable than one that is still rising sharply at that time.

[9] Recent developments have made possible calculation by this formula of t_p values for 15 lots of GR-S mentioned in the first two paragraphs of this article. Based on a large number of comparisons, formulae have been developed by the Synthetic Rubber Division, RFC, which relate modulus and strain values for a variety of polymers. Application of the formula for GR-S to the modulus data obtained in 1946 yielded t_p values with a maximum spread of nine minutes and an average deviation from the mean of only two minutes. This fact is interesting presumptive evidence that the variability of GR-S at that time was not so great as the compounders' selections of optimum curing time indicated.

Rate of Cure

Frequently comparisons of rates of cure are expressed as the times required to bring compounds to their optimum states of cure. Such a method is an erroneous application of the term "rate." A rate must express quantitative changes in some property per unit of time. Examination of the curves in Figure 1 will show that the rate of cure, defined as the change in some physical property per unit of time, varies from the beginning of the heating period to the end. The rate of change of modulus or tensile strength per minute of cure cannot be computed by any simple equation, but the change in strain (constant-load elongation) can. The rate of change in the latter method is the value of dE/dt, i.e., the increment of elongation per unit of time. If 0.68 is the correct value in equation (5), substitution of the value of $(t_p - t_o)^2$ derived from this equation in

$$\frac{dE}{dt} = \frac{1/k}{(t_p - t_o)^2}$$

yields the value of 2.16 for dE/dt as the criterion for preferred (optimum) cure.

Two compounds may be curing at the same rate at one time of cure and at different rates at all other cures. For example:

Compound	t_p Min.	1/k (Min.)	dE/dt (%) At 25 Min.	dE/dt (%) At 50 Min.	dE/dt (%) At 100 Min.
A	0	5402	8.64	2.16	0.54
B	10	3469	15.40	2.16	0.48
Ratio of $\frac{\text{rate A}}{\text{rate B}}$	....	....	0.56	1.00	1.13

These data are illustrated in Figures 4, 6a and 6b. (In Figure 6b the time and elongation units are not the same length.)

It is not necessarily correct to state because two compounds attain the same modulus or tensile strength in the same time that they are curing at the same rate; nor is it correct to assume that two compounds of the same optimum cure selected on the basis of dE/dt = 2.16 are alike in curing rate at any time other than the optimum.

Level of Cure

In comparing curves similar to those shown in the schematic Figure 7 some technologists have asserted that because at time t the modulus of M is greater than that of N, compound M is curing at a higher rate.

As shown in the figure, at time t the change in modulus per unit of time for compound M is less than for compound N (its slope is smaller); that is, M is curing at a lower rate than N. Nevertheless compound M attains its optimum cure O_M sooner than compound N reaches its optimum, O_N. The comparative modulus levels attained by two compounds at any time are not criteria of their relative rates of cure or of their relative states of cure. In this instance compound M is at a higher level of cure than N at all times.

It has been suggested that distinction should be made between variations in modulus levels resulting from different amounts of vulcanizing ingredients and from different types or amounts of fillers. It was also suggested that levels of cure of different compounds should be compared at the same *state* of cure rather than at the same *time* of cure.

To show the difference in the relative positions of modulus values when plotted against time of cure and against state of cure, Figure 8 is presented. These

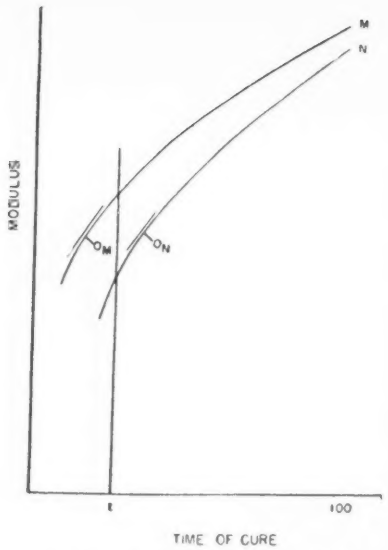


Fig. 7. Relative Curing Rates of Compounds M and N

curves for compounds K and V are based on data for compounds differing only in the variety of carbon black contained. The curves for modulus plotted against dE/dt values are nearly parallel; whereas those plotted against time of cure obviously are not parallel. The abscissa scale applies to both time and dE/dt values.

Brief Definition of Terms Related to Curing

STATE OF CURE (degree of cure) is described by the terms *undercure, overcure* and *good, optimum,* or *correct cure,* depending upon values obtained by measuring some physical property of a series of specimens of a compound cured for different periods of time. Strain (constant-load elongation) data offer a simple method of calculating all states of cure mathematically.

TIMES FOR EQUIVALENT CURE are usually considered as the relative times required for optimum or best technical cures of different compounds. Strain data make possible a ready comparison of the times required to bring compounds to *any* selected state of cure.

OPTIMUM CURE has been variously defined and still has different meanings to various technologists. Strain data permit calculation of optimum cures of compounds in comparison with a standard which each technologist may select for himself. In the past, technologists studying the same sets of data have assigned widely different times for optimum cures. From a given set of strain data, solution of an equation for optimum curing time can yield only one result.

BEST TECHNICAL CURES are those which produce desired properties to specified quantitative levels at times close as possible to the optimum cure.

RATE OF CURE at any selected time is measured by the amount of change in some physical property which is occurring per unit of time at that point. Graphic methods have been used to determine rates of change of modulus, tensile strength, or other physical properties, but more accurate results are obtained by calculation of rates from strain data.

LEVELS OF CURE are measured by the absolute values of properties such as modulus, tensile strength, or strain and are usually compared at equal times of cure. Strain data make it possible to compare levels also at equal states of cure. Relatively high levels at a selected time

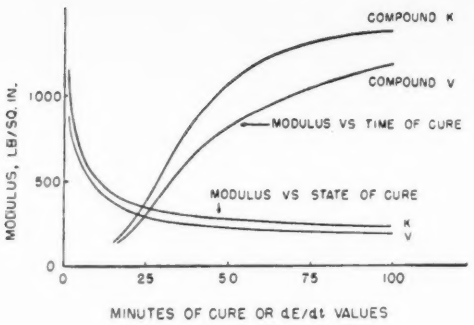


Fig. 8. Modulus *vs.* State of Cure and Modulus *vs.* Time of Cure Curves for Compounds K and V

do not necessarily indicate higher rates of cure, as is often assumed.

Carbon Black Statistics—Fourth Quarter and Yearly Totals, 1951

Following are statistics for production, shipments, producers' stocks, and exports of carbon black for the fourth quarter and total 1951. Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; FEF, fast extruding furnace black; and HAF, high abrasion furnace black. Statistics on thermal black are included with SRF black to avoid disclosure of individual company operations.

(Thousands of Pounds)

	Oct.	Nov.	Dec.	Total, 1951
Production:				
Furnace types:				
SRF	33,985	33,923	33,410	377,724
HMF	12,988	12,159	11,951	139,175
FEF	21,563	17,607	19,506	211,220
HAF	28,469	30,804	33,882	314,956
Total furnace	97,005	94,493	98,749	1,043,075
Contact types	54,715	53,491	54,021	646,139
TOTALS	151,720	147,984	152,770	1,689,214
Shipments:				
Furnace types:				
SRF	31,046	29,801	27,843	363,911
HMF	10,137	9,708	9,254	129,624
FEF	18,031	15,632	15,677	194,871
HAF	31,518	29,814	28,840	294,938
Total furnace	90,732	84,955	81,614	983,344
Contact types	44,255	43,464	43,420	589,350
TOTALS	134,987	128,419	125,034	1,572,694
Producers' Stocks, End of Period:				
Furnace types:				
SRF	10,239	14,361	19,928	19,928
HMF	10,566	13,017	15,714	15,714
FEF	13,242	15,217	19,046	19,046
HAF	20,862	21,852	26,894	26,894
Total furnace	54,909	64,447	81,582	81,582
Contact types	101,475	111,502	122,103	122,103
TOTALS	156,384	175,949	203,685	203,685
Exports:				
Furnace types	12,985	12,948	13,729	151,499
Contact types	19,749	21,056	20,276	281,996
TOTALS	32,734	34,004	34,005	433,495

Source: Bureau of Mines, United States Department of the Interior, Washington 25, D. C.

Under stimulus of prevailing high prices, exports of NATURAL rubber from Nigeria reached 13,383 long tons in 1950, topping the previous record of 11,448 long tons for 1946. The total for 1949 was 6,850 tons.

With Liberian production about 30,000 tons in 1950, that of Belgian Congo more than 8,000 tons, and that of French Africa about 1,400 tons, it would seem reasonable to expect that statistics for 1951 will show total outputs for all Africa well over the previous record of more than 54,000 tons reached during World War II.

Recent Developments in

Footwear

B. H. Capen[1]

AFTER two rather mild winters the waterproof footwear industry enjoyed one of its better years in 1951. Heavy snows early in the season throughout the western and central states resulted in a heavy demand for waterproof rubber footwear. The East Coast, however, particularly in the areas of large population, did not have the usual snowfall early in the winter, and business in waterproof footwear, consequently, was not too brisk in these areas.

Jobbers and retailers had stocked heavily just after the beginning of the Korean War in 1950, and replacement buying will not be very heavy until supplies for the 1952-1953 winter season are ordered. The result is that although about four million more pairs of waterproof footwear were manufactured in 1951, the inventories in the hands of jobbers and manufacturers are about the same as they were a year ago.

In the field of new products, considerable interest is being shown in new dress shoes for women in which the new synthetic woven fibers are used as uppers for shoes topped off with shearling or fur. Some of these shoes are being shown at the present time, and many more are being styled and will appear in retail channels in the fall of the year.

A new sport shoe of the casual type, with a thick crepe-like sole, is being marketed for men and is being very well accepted. The production of this type of shoe in 1952 will be many times that of 1951 and should be very helpful in maintaining production levels in the footwear branch since it is a product that can be made successfully only by the rubber industry. Many leather shoe manufacturers may also try to produce a similar-type shoe because of its current popularity. The upper of this type of shoe employs many variations of fabrics, but monk's cloth in various solid colors and faded blue denim are the materials which are most in demand at the present time.

The greatest interest of the Armed Services is in the insulated boot developed for cold weather wear by the Army, Marine Corps, and the Navy. The design of this shoe is very ingenious and employs the vacuum-bottle principle to insure insulation from the cold. The boot is built over a latex stocking, and then all the insulating material is sealed in by a series of dips in latex, and a partial vacuum formed. The boot has been a complete success in extreme cold weather, even at —40° F., with no discomfort experienced by the wearer. The Armed Services will purchase a large quantity of these boots in the near future, and all footwear plants are equipping themselves to manufacture them, if they have not already done so. The boot will also find acceptance in the civilian market, particularly among sportsmen going out hunting and fishing, especially when fishing is done through ice.

In the field of compounding, the footwear industry was held to a ratio of 80 parts by weight of natural rubber and 20 parts of synthetic rubber for the year 1951 by the M-2 Rubber Order of the National Production Authority. The M-2 Order, as amended December 14, 1951, effective January 1, 1952, changed the ratio to 70 parts of natural rubber and 30 parts of synthetic rubber for footwear products, at which point it remained on March 1. The use of GR-S at the allowed amount in footwear manufacture is not too great a burden and is being handled satisfactorily by the industry. There is a need, however, for a GR-S polymer that is especially adapted to waterproof footwear manufacture, and it is the hope of that branch of the rubber goods industry that a more satisfactory GR-S polymer will be developed. The necessary development work is being done, and there is some reason to believe that an improved polymer for footwear will be available some time in the near future.

With the expected demand for the new insulated boot and the new women's and men's shoes mentioned above, together with the heavier snowfall experienced in many sections of the country, the footwear industry is looking forward to a satisfactory volume of business in the current year.

[1] Technical superintendent, Tyer Rubber Co., Andover, Mass.

Fig. 1. Nylapac Women's Dress Boots Made of Nylon-Rayon Gabardine and Lined with All-Wool Alpaca (United States Rubber Co.)

Fig. 2. Insulated Shoepac for Armed Services (Hood Rubber Co.)

Fig. 3. Bo'sun—Men's Casual Sport Shoe with Crepe-Like Sole (Tyer Rubber Co.)

Industrial Molded Products

B. H. Capen

DURING 1951, the manufacturer of industrial molded rubber products saw his production of goods for civilian use reduced and his production of goods for defense needs increased. Production during the first part of the year was at a high rate, with the majority of goods being made for civilian use; this situation was altered by the changes in M-2 which eliminated or reduced the number of products that could be made for such use. Some relief was granted later by NPA to allow certain necessary industrial molded products for civilian use to be made.

The reduction in automobile output decreased the demand for molded items for that industry, and a similar decrease in the manufacture of household appliances, because of the lower allotments of steel and copper, has resulted in less demand for molded products for that industry also. Demand for products for the Armed Services, however, is particularly heavy.

Molded products for the Armed Services require that exacting specifications be met, and improved adhesion to metal and resistance to low temperatures are representative of such requirements that have been a problem to the fabricating industry since World War II. One of these specifications calls for flexibility at extremely low temperature (—100° F.) for quite long periods of time (15 days). Research and development on special polymers to meet some of these specifications is continuing, and it is hoped that new polymers to help the industrial molded goods manufacturer will be forthcoming in the current year, since the industry faces some real problems in satisfying some of these requirements of the Armed Services.

An exhibition of the many and varied uses of silicone polymers by one of the major producers in some of the larger cities throughout the country created much interest in the molded products industry.

The interest in new developments and new uses for the neoprenes, nitrile type rubbers, and the various types of GR-S has continued. Blends of these rubbers with vinyl plastics have been made with excellent results. Some of the softer vinyl plastics have been used in competition with the soft rubber polymers, and molders of industrial rubber products, who have not done so already, should take a good look at these soft vinyls for future possible use.

The polyacrylic rubbers, which have very good high-temperature properties and are somewhat less satisfactory at low temperatures, have been used to advantage in the production of "O" rings, grommets, gaskets, valve seats, and packings.

The high styrene copolymers with butadiene are finding further acceptance in many products, either alone or in combination with other polymers. This material is replacing hard rubber to some extent because of its very high impact resistance.

Many molded items, both for civilian and defense use, are now being produced by transfer molding, and parts that heretofore could not be held to close tolerance by compression molding are being made by the transfer molding method. Larger cross-sections and heavier items are now being molded as the technicians learn the intricacies of this method of producing parts to exacting specifications.

In addition to the increase in production for defense during the current year, it is expected that an increased amount of production for civilian use will be possible, so that the overall outlook for the industrial molded goods branch of the industry for 1952 should be very good.

The Physics of Rubber

S. D. Gehman[2]

THE applications of physics in the rubber industry exhibited many phases in the past year. These extended all the way from long-range research investigations of the molecular basis of rubber elasticity to such subjects for immediate action as production difficulties with processes or products. It is to be expected that electronic and automatic servo systems for inspection and control in the factory will appear with increasing frequency as physicists are called upon to work on some of these problems.

As an illustration of the utilization of recent progress in physics may be mentioned the radioactive thickness gage. The problem of the accurate gaging and control of calendered fabric and other sheet material has always been with us. The radioactive thickness gage is the engineering embodiment of new physical principles to try to solve this problem. It uses a source of radiation, an artificial radioisotope, Strontium 90, prepared at Oak Ridge. The intensity of the radiation which passes through the sheet to be gaged is determined by a sensitive ionization chamber and electronic amplifying system. This transmitted intensity is used as a measure of the weight per unit area of the sheet, or with suitable calibration of the thickness. A number of rubber companies installed such gages during the last year. They were considered to give such improved control of calendered gages as to justify public announcements of their adoption.

It was inevitable that sooner or later the rubber industry would hear of "Operations Research."[3] This happened last year in the publication of activities along these

[2] Goodyear Research Laboratory, Akron, O.
[3] *J. Rubber Research*, 20, 63 (1951).

lines by the Research Association of British Rubber Manufacturers. "Operations Research" is not necessarily even predominantly physics, but has become associated with physics, especially in this country, because of the leading part which physicists took in these activities during the war. "Operations Research" has been defined as "a scientific method of providing managements with data upon which to base executive decisions." Whether it has anything essentially new to offer for the rubber industry is debatable. But with these first efforts in this direction now on hand, the value of the methods and approaches of "Operations Research" for improving processes and products may well be examined, especially where physicists in the industry are looking for opportunities to broaden their activities.

The advent of oil polymers called for new intensive work in fields of physics concerned with the evaluation of the whole gamut of physical properties which are significant for tire performance. The progress made in these methods of laboratory testing has been an important contributing factor in the rapidity with which oil polymers have come into use.

The very important complex property of abrasion resistance, however, still escapes satisfactory laboratory evaluation. Consequently it has been a subject of continuous interest for physicists. An effort is evidently being made to arrive at an understanding of some of the basic factors and mechanisms involved in the abrasive wear of rubber. An interesting new idea coming to the fore is that a fine grained heterogeneous structure in the carbon black-rubber matrix, rather than a uniform dispersion, may be essential for the best resistance to abrasion.

In regard to the more fundamental research activities in the physics of rubber, dynamic properties or the study of the response of polymer systems to low amplitude, high-frequency forces seemed to occupy the center of the stage. Definite progress is evident in the generalization of the mathematical descriptions of these phenomena for wide frequency and temperature ranges.

The Sole and Heel Industry - 1951

THE production and the sale of shoes during 1951 were far from satisfactory from the shoe manufacturer's viewpoint. The optimistic outlook of most manufacturers and merchants in early 1951 for a good volume of business proved to be erroneous.

The appreciable reduction in shoe production in 1951 was reflected in a corresponding reduction in the production of the rubber sole and heel industry.

In 1950, shoe output reached 512,000,000 pairs, the second highest production total in shoe industry history. Shoe production in 1951 was about 470,000,000 pairs, of which approximately 20,000,000 pairs were for the Armed Services. A reduction of about 60,000,000 pairs in the production of shoes for civilians is indicated.

This large reduction in shoe production caused a decrease in the production of the sole and heel industry as compared with 1950 output, that year which was a banner year also for the sole and heel industry.

In 1951, rubber heel production was off as much as 20%, compared with 1950 figures, and was about 5% less than in 1949.

In 1951, rubber sole production actually showed a small increase over that of 1950 and was appreciably more than for 1949.

In 1951, rubber slab production was slightly below that of 1950, but was still somewhat greater than in 1949.

The heavy purchases of shoes by retailers and jobbers in the latter part of 1950 and during January and February, 1951, in an attempt to build up inventories and in anticipation of possible shoe rationing and raw material shortages, resulted in heavy inventory accumulations by shoe manufacturers, jobbers, and retailers. At the end of 1951 the "digestion" of these inventories appeared to be about over, and the inventory situation in retail stores and the shoe departments of other stores leads to the general expectation of better business for the shoe industry and the sole and heel industry in 1952.

Furthermore there seems to be accumulating evidence that purchases of necessities and needed soft goods cannot be further delayed by the American public; the outlook for non-durables like shoes is improving noticeably.

If this optimistic outlook becomes a reality, the prediction for civilian shoe production of 475,000,000 pairs seems possible of attainment. Improved shoe production will, of course, mean improved demand for rubber soles and heels.

Shoe Repair Industry Situation

The shoe repair industry experienced just about the same slackening of demand in 1951 as did the shoe manufacturing industry. Heavy buying of soles and heels in late 1950 and early 1951 resulted in large inventories which took the jobber and the repairman out of the market for months.

Purchases of rubber heels by the shoe repair industry in 1951 showed an even greater falling off than purchases by shoe manufacturers; the amount of the decrease in this case was almost 30%.

While the purchases of rubber soles by the shoe manufacturing industry in 1951 showed a slight increase over 1950 figures, the purchases of half soles and full soles by the shoe repair industry registered a slight decrease. The demand for slabs by the repair industry was reduced to an even greater extent than that for soles in 1951.

Lowered inventories in the hands of jobbers and repairmen and the noticeable strengthening of the market for non-durable goods should result in better business in the shoe repair field and increased demand for rubber soles and heels, just as is anticipated in the shoe manufacturing industry.

In addition, the drive initiated by the entire sole and heel industry to improve business in the shoe repair field should help to increase demand in 1952. Campaigns featuring window and store display material; advertising conducted by sole and heel manufacturers in newspapers, magazines, on billboards, car cards, and by means of radio and television, all help to create interest in the sole and heel products which the manufacturers are promoting. The sole and heel industry will increase its efforts also toward the encouragement of repair shop modernization and improved appearance.

Product and Process Developments

Government restrictions on the use of natural rubber did not materially affect the sole and heel industry during 1951. The threatened limitation of colors in soles and heels did not materialize.

The complete elimination of crepe soles and heels, effective March 1, 1951, was quite a blow to the shoe industry. The use of crepe soles and heels was definitely limited to consumption of inventories on hand as of March 1, for both shoe manufacturers and repairmen.

The use of non-leather soles showed a continued increase according to November, 1951, statistics. A total of 58.4% of the shoes and slippers manufactured in November had non-leather soles; 52% of the total soles used were composition and rubber; 41.6% were leather; the remaining 6.4% used other types of outsoles.

The largest single new development during 1951 in the sole and heel industry was the cellular crepe-type sole. The acceptance of this new sole was immediate and terrific.

The new cellular crepe sole is waterproof, will float on water, and is in reality lighter than the original and long-popular natural rubber crepe sole. It is freely predicted that this sole will replace the natural rubber crepe sole permanently, even when and if the latter again becomes available.

Cellular crepe soles may be made in colors to match the color of the shoe upper. These soles are made with square, bevel breast heels, or with underneath wedge for platform-type shoes. Practically all these soles are applied with cement, but may also be stitched on with the proper equipment.

Cellular elastomer-resin insoles and outsoles were introduced during 1951, and these items, being lighter than leather, should enjoy an even wider acceptance because of the reduced weight and added comfort their use affords the shoe wearer. Elastomer-resin soles introduced in 1950 have had a remarkable acceptance and increased in sales volume in 1951. Sales of insoles of this type run into millions of pairs.

A new non-leather upper material, first shown at the Chicago Shoe Show, created a great amount of interest. This new material is offered in various colors and thicknesses suitable for both men's and women's shoes.

Great strides have been made in the acceptance of non-leather type materials for luggage; a widely diversified line of all types of two-suiters, overnight bags, purses, billfolds, children's cowboy belts and holsters, camera cases, etc., have been developed.

Shoe Factory Management Conferences

The National Shoe Manufacturers Association has in recent years promoted Factory Management Conferences for shoe industry executives. In this connection the Association said:

"The Conferences were designed to give each shoe manufacturing delegate an opportunity to join in panel or group discussions covering specific types of shoe construction. The ultimate purpose is to reduce production costs, find new means of increasing factory efficiency, and to improve the quality of footwear."

The first conference was devoted exclusively to group discussions among shoe manufacturers. At the conclusion of the first conference it was considered advisable to permit educational exhibits on the part of those servicing the shoe industry. Such an arrangement would enable shoe manufacturer representatives to become acquainted with machinery, supply and equipment houses and to secure first-hand knowledge of technological developments by such organizations.

Sole and heel manufacturers participated in these conferences for the first time in May, 1951, in Cincinnati, O. The resulting contacts were highly beneficial to both the shoe manufacturer and the sole and heel industry representatives.

The meeting scheduled for May 11-13, 1952, at Cincinnati, will include the largest representation of the sole and heel industry to date. It is expected that this decided step forward in further industry cooperation by the National Shoe Manufacturers Association will be of considerable and increasing mutual benefit with each passing year.

The Reclaimed Rubber Industry — 1951

J. M. Ball[1]

ALL-TIME records for the production and the consumption of reclaimed rubber were established in 1951. Consumption was about 346,000 long tons, 14% higher than in 1950, and, furthermore, the consumption ratio of reclaimed to total natural and synthetic rubber was 28.5%, 4.4% higher than in 1950.

The reasons for this big increase in the use of reclaimed rubber are obvious. The government conservation program on natural rubber, the high price of natural rubber, and the insufficient supply of GR-S during the first half of the year all combined to raise the demand for reclaim above normal. The demand became so great that for the period from June, 1950, through the middle of July, 1951, it could not be satisfied by the then existing production facilities. All the reclaimed rubber plants in the country were running seven days a week around the clock, but still could not make enough material to supply the demand during that period.

The price of new rubber alone during the first half of 1951 would have been enough to insure an enormous demand for reclaim. No. 1 Ribbed Smoked Sheet sold for more than 70¢ a pound during the first quarter. In the second quarter the price was fixed by the government at 66¢ a pound, and for the last half of the year at 52¢ a pound. GR-S sold at an average price for the year of 25¢ a pound. In view of the relative amounts of natural and GR-S rubber used this pricing meant that first-quality new rubber during the year cost four times as much as first-quality whole tire reclaim at 10¢ a pound. Such a price advantage in favor of reclaimed rubber will, in itself, cause a lot of it to be used without much sales effort on the part of the producers.

[1] Midwest Rubber Reclaiming Co., East St. Louis, Ill.

The reclaimed rubber industry did a very good job of voluntarily allocating their product throughout this entire difficult period, and the rubber goods manufacturers, in turn, were completely understanding and cooperative.

Industry Expansion Program

Some units of the reclaimed rubber industry had already expanded and modernized their plants since the war, and many others realized that 1951 would be the logical year to enlarge and improve their production facilities. Certificates of necessity were granted by the government for this purpose up to what appeared to be a reasonable expansion of the industry's capacity, and most of these certfiicates have now been exercised.

Cooperation with NPA Rubber Division

Leland E. Spencer, director of the Rubber Division, National Production Authority, during 1951, requested and obtained from industry the services of a corps of technical men representing various branches of rubber goods manufacturing. Included in this group was a representative of the reclaimed rubber industry whose duties were to follow the general situation and to try to be of service as a liaison man between government and his branch of the industry. Three men served in this capacity on a rotation basis during 1951: the writer; T. H. Fitzgerald, Naugatuck Chemical Division, United States Rubber Co.; and C. F. Hoover, Pequanoc Rubber Co. Reclaimed rubber was not allocated, but did fall under the jurisdiction of the NPA's Rubber Order M-2.

Both industry and government were fortunate in having Mr. Spencer, a man of understanding and business judgment, at the head of the operations of the NPA Rubber Division during 1951.

Consumption in Transportation Items

During 1951 the consumption of reclaimed rubber in tires, inner tubes, and repair materials amounted to almost exactly 50% of the total reclaim consumption, a gain of about 3% over the 1950 figure. (The consumption of new rubber in transportation items was about 70% of the total new rubber consumption.)

The ratio of reclaimed to new rubber consumption in transportation items was about 22%, a gain of about 4% over 1950.

This increase in the use of reclaim in tires and camelback was accompanied by a large increase in the proportion of GR-S used. In 1951 the GR-S consumed in tires and camelback was about 58% of the total natural plus GR-S, as compared with about 37% in 1950. These facts are cited in refutation of the statement sometimes heard in the tire industry that as the use of GR-S in tires goes up, the use of reclaimed rubber goes down.

Consumption in Non-Transportation Items

In all non-transportation products the consumption picture is similar to that for transportation items, but it is by no means identical.

The consumption of reclaimed to total natural and synthetic rubber in non-transportation items in 1951 was about 43%, a gain of about 7% over 1950 use. April, 1951, represented the high point in the reclaim consumption ratio, and thereafter the ratio fell off until in November of that year it reached the pre-Korean figure of about 32%.

Reclaim Prices

The only important change in the price of reclaimed rubber during 1951 was in November when black natural rubber inner tube reclaim was reduced about 10%.

The average price of first-quality whole tire reclaim in 1951 was about 10¢ a pound, compared with about 9¢ a pound for 1950. The wholesale price index for all semi-manufactured articles was 14% higher in 1951 than in 1950.

On July 30, 1951, the Office of Price Stabilization issued Ceiling Price Regulations 58 and 59 covering reclaimed and scrap rubber, respectively.

Industry Government and Association Representation

G. K. Trimble, Midwest Rubber Reclaiming Co., was the representative from the reclaimed rubber industry at the eighth meeting of the International Rubber Study Group held in Rome, Italy, during April. He presented a paper discussing all aspects of the industry. The Rubber Study Group Statistical Bulletin gives the productive capacity of the rubber reclaiming industry of the United States on a 6½-day week, 24 hours-a-day basis, as 389,000 long tons a year. This figure was estimated before the new production expansion program got under way.

J. H. Nesbit, U. S. Rubber Reclaiming Co., continued as the representative of the reclaiming industry on the NPA Rubber Industry Advisory Committee. Mr. Nesbit has served his country and his industry well in this capacity.

The officers of the Rubber Reclaimers Association for 1951 were as follows: president, R. E. Casey, Naugatuck Chemical Division; vice president, D. S. Morse, Bloomingdale Rubber Co.; and secretary-treasurer, C. T. Jansen, *Rubber Age*.

Manufacturing and Technological Advances

Definite progress was made during 1951 in the production of relatively non-stain reclaimed rubber for use in the manufacture of automobile mats. A black reclaimed rubber remains the most efficient material for this use because it gives the best physical properties at a given price in the finished product to automobile manufacturers. The splatter spray color scheme on the surface of mat, however, calls for relative freedom from staining in the base material. The cooperation between car makers, mat makers and reclaimers on this development problem was excellent.

As of early March, 1952, the M-2 Order did not permit the manufacture of white sidewall tires, but the reclaimers are ready with a low-staining reclaim having satisfactory physical properties, whenever the production of such tires is permitted.

It was not until July, 1951, that the reclaimed rubber industry got its first breathing spell after 15 months of peak production effort; therefore no great technological advance occurred during 1951. An article by R. N. Hader and D. S. le Beau[5] is recommended to those interested in the chemical engineering aspects of rubber reclaiming.

In May, 1951, an article by D. Comes[6] described the Banbury-Lancaster method of reclaiming rubber. This method has come into limited use in certain places for

(*Continued on page 78*)

[5] *Ind. Eng. Chem.*, 43, 2, 250 (1951).
[6] India RUBBER WORLD, 124, 2, 175 (1951).

Further NPA Report on Estimated and Actual Rubber Consumption by Products

RUBBER CONSUMPTION, PERCENTAGE BY END-PRODUCT, ACTUAL OR ESTIMATED FOR INDICATED PERIODS OF TIME

M-2 App A Code	Product Classification	"A"* Year Ending 3/31/41	"B"† Year Ending 12/31/41	"C"† 2nd Qtr. 1945	"D"‡ Requirements 3rd Qtr. 1951	"E"‡ Requirements 1st Qtr. 1952	"F"‡ Actual 3rd Qtr. 1951
1-8 incl.	Transportation items	70.6	75.97	§72.87	67.3	66.5	69.9
	Non-Transportation						
9	Belts and belting				1.3	1.3	1.3
10	Hose	11.6	10.76	7.86	1.9 10.9¶	2.0 10.6¶	2.0 10.2¶
11	Packings and gaskets				1.4	1.2	1.1
12 A-O	Other mechanicals				6.3	6.1	5.8
12P	Hard rubber products	0.7	0.78	....	1.0	1.0	1.0
13	Wire and cable	3.2	2.46	4.84	2.7	2.8	2.6
14	Rubber footwear	2.6	3.00	1.84	1.9	1.8	2.0
15	Shoe products	3.2	2.22	5.39	4.1	4.3	3.9
16	Cements	....	....	....	0.4	0.6	0.5
17	Proofed goods	1.5	1.20	1.24	1.0	1.0	0.8
18	Drug sundries	1.0	0.83	0.40	0.9	0.9	0.8
19-21	Flotation, life saving equipment, fuel cells	....	....	4.03	0.3	0.3	0.1
22A	Athletic goods	0.6	0.41	....			
22C, M	Sponge rubber products and rubberized fiber and hair cushioning	2.2	1.77	....	3.1¶	3.2¶	2.4¶
22G	Stationers' supplies	....	0.39	....			
22K	Toys	....	....	....			
22L	Flooring	....	0.21	....	1.0	1.2	1.0
22	All other—miscellaneous	2.8	....	1.53	1.3	1.4	1.1
23	Latex foam	*a*	*a*	*a*	3.2	3.2	2.5
X	Masterbatch for resale	....	....	....	0.9	1.2	1.2

* Source—WPB figures.
† Source—RMA figures.
‡ Source—NPA figures.
§ Overall figure of 72.87 includes 1.95 of Code 8-tank blocks, treads, etc.
¶ Total Codes 9 to 12—0 inclusive.
‖ Total includes Code 24—miscellaneous.
a Foam latex apparently included in 22C.

IN OUR March issue we reprinted the memorandum issued under the date of January 9, 1952, by the Rubber Division, National Production Authority, which made available estimates of the amounts of various types of rubbers used in about 30, each, transportation and non-transportation products. These data were made possible by data obtained from NPA forms NPAF-58 and NPAF-59, "Manufacturers' Quarterly Report of Proposed Consumption," submitted to the Rubber Division by rubber consumers in connection with their proposed use of new rubber for the third quarter of 1951.

Another memorandum, dated March 11, has now been received from the NPA Rubber Division, this one from Aden R. Miller, chief, requirements and production branch, also on the subject of "Rubber Consumption—Percentage by End-Product." In this memorandum estimated third-quarter 1951 figures are compared with actual figures; first quarter 1952 estimates are provided, and all are compared with similar figures for periods during 1941 and 1945.

The following analysis of the third quarter 1951 estimated *vs.* actual 1951 figures was included in the March 11, NPA memorandum:

PERCENTAGES SHOWING AN INCREASE

Codes 1-8, inclusive, transportation items	67.3 to 69.9
Code 14, rubber footwear	1.9 to 2.0
Code 16, cements	0.4 to 0.5
X, masterbatch for resale	0.9 to 1.2

PERCENTAGES SHOWING DECREASE

Codes 9 to 12P, mechanical rubber goods	10.9 to 10.2
Code 13, wire and cable	2.7 to 2.6
Code 15, shoe products	4.1 to 3.9
Code 17, proofed goods	1.0 to 0.8
Code 18, drug sundries	0.9 to 0.8
Codes 19, 21, flotation, life saving equipment, fuel cells	0.3 to 0.1
Code 22	3.1 to 2.4
Code 23, latex foam	3.2 to 2.5

Reclaimed Rubber

(*Continued from page 77*)

handling fabric-free, factory generated scrap. Light-colored scrap rubber may also be handled by this process.

The digester process, by which the fiber in ground tire scrap is chemically decomposed and subsequently removed by washing, still accounts for the largest amount of reclaim made. The main objective of the reclaimers is to make first-quality material at the lowest cost.

The mechanical separation of fiber from vulcanized scrap rubber by a dry process is at least 75 years old. The early methods were crude and did not result in good separation. It was not essential to improve these methods at that time because later on Marks invented the digester process which solved the problem of free sulfur as well as of the fiber. Today free sulfur is not a problem, and considerable reclaim is made now from mechanically separated scrap. There is still room for improvement in mechanical method, however, and it may be that the mechanical separation method, as it is improved, will become more and more important. Briefly, the advantage would be the elimination of waste plus the addition of a salable by-product in the form of cotton scrap fiber.

One thing is certain, the reclaimed rubber industry is definitely on the way toward adopting new processes designed to eliminate expensive operations. It must do this to remain competitive with new rubber. The challenge and the opportunity are great.

Editorials

Can Inflation Be Halted?

APPARENTLY seriously alarmed at the prospect of the effect of another wage-price spiral on the national economy at this time, Defense Mobilizer Charles E. Wilson, in late March decided to try and do what he could to call a halt to the course of inflation that has become so pronounced in the last year. After a conference with President Truman, the Mobilization Chief announced on March 25 that he was not in favor of the Wage Stabilization Board's recent decision that the United Steel Workers, CIO, should be granted a 17½¢-an-hour wage increase and other benefits which would make the total cost to industry at least 22½¢ an hour.

Wilson indicated that he felt that the WSB proposals, if acted upon, would threaten the economic stabilization program. Since it was expected that the wage increase would be followed by a price increase for steel, and then by similar wage increases for the oil workers, rubber workers, etc., and then price increases for the products of these industries, it seemed easy to see the logic of Wilson's position.

Further developments which resulted in the resignation of Wilson as Defense Mobilizer on March 31 indicate, however, that not only do President Truman and his supporters believe that "the proposed changes in wages and working conditions are by no means unreasonable and do not in fact, constitute any real breach in our wage stabilization policies," but that "if the eventual settlement of the wage negotiations is such that a price ceiling increase is required on the grounds of fairness and equity or otherwise in the interest of the defense effort, it will be granted; otherwise it will not."

Of equal or even greater importance was the President's further comment that:

"For example, it seems to me to be quite material and important that the profits of the steel industry are continuing at extraordinarily high levels—that their profits amount to a good many times as much as any increased costs that they would incur under the recommendations of the Wage Stabilization Board."

The basic future policy of the present administration in its economic stabilization program is now out in the open. Wages will be permitted to rise, but prices will not; higher wage costs are to come out of industry profits.

If the wage increase recommended by the WSB is not granted by the industry, a steel strike appears inevitable. If the wage increase is granted, and an adequate price increase is not, industry operations, and what is of probably equal or greater significance, industry's return to its investors, will suffer.

The shape of things to come for the rubber and associated industries, as well as for the steel industry, may be foreseen from the above indicated trends. Of course the President can halt by unjunction any strike in the steel or other industries for 80 days and then if no settlement is reached, take over the industry in question in the interest of national security.

Inflation, for which the government itself is primarily responsible, has progressed to the point where, if wage-price spirals are allowed to continue unchecked, even those who benefit directly will soon find that their temporary gains disappear almost over night.

The real danger in the present situation is that when management-labor relations become stalemated in basic industries, public opinion often forces government to take over more and more control of the nation's economy.

WHEN Will Synthetic Rubber Be Free?

IT LOOKS as though control of the production and distribution of GR-S and butyl synthetic rubber will remain in Washington for another two years, in spite of the promising outlook in January for the liberation of butyl rubber at least. In recommending a flat two-year extension of the present Rubber Act, the House Armed Services subcommittee on rubber said during March:

"While arguments can be made justifying an exception in the case of butyl rubber plants, the committee is of the opinion that at this particular time the entire program is operating satisfactorily and for the best interests of the Government. The committee would be opposed to any effort, at this time, to treat the whole synthetic rubber program as anything other than an integral and inseparable part of the defense program."

In this connection some recent remarks on the government's synthetic rubber program by United States Rubber Co.'s vice president, John Coe, are particularly pertinent:

"But the dangerous point is that seven years after the war, the Government is still owning and operating the business. Every two years, Congress has said that, of course, the best defense security requires a privately owned synthetic rubber industry—but not yet.

"I believe it is time for the Government to get out of the rubber business. I believe that synthetic rubber is ready now to be run by the people in the true spirit of free competition. . . ."

India RUBBER WORLD agrees with Mr. Coe, but unless a miracle happens, the beginning of a large private synthetic rubber industry in this country will have to wait two more years—at least.

R. G. Seaman

DEPARTMENT OF
PLASTICS TECHNOLOGY

Use of Beryllium Copper in Plastic Molds

Malcolm A. Nichols[1]

PLASTIC molds are fabricated in various ways and of different materials. Now has come into prominence a new alloy, strong, sturdy, tough, and dependable beryllium copper. Metallurgists had long sought a satisfactory method of combining the strength and hardness of steel with the conductivity and corrosion resistance of copper. After many years of research it was found that the addition of small amounts of beryllium to several of the non-ferrous metals would give alloys having the desired properties.

Beryllium copper possesses an unusual combination of intrinsic properties. By virtue of its versatility, the alloy is rapidly finding increased use in a variety of industrial applications. Through heat treatment a wide range of useful properties can be obtained. The strength and hardness of the alloy can be doubled, and substantial increases can be obtained in its electrical and thermal conductivities. In addition, the alloy is non-magnetic and offers good resistance to corrosion, wear, and fatigue.

Basically, beryllium copper is a tertiary alloy composed of copper and 0.5-3% of contained beryllium combined with either cobalt or nickel. The presence of the third element (cobalt or nickel) is functional in that it adds granular refinement to the alloy. Several beryllium copper alloys are available commercially, each offering a different combination of physical properties. In color, these alloys range from a deep coppery bronze to a yellow gold, depending on composition. Most of the different alloys are available in sheet, rod, master alloy, strip, wire, and billet or pig forms.

Use in Plastic Molds

The use of beryllium copper in plastic mold applications begins with the casting of the alloy from pigs. Castings can be made by different methods such as sand-castings, the "lost wax" or investment method, vacuum casting, centrifugal casting, and pressure casting; each has its own function in the industrial picture.

The pressure casting method is the best for the fabrication of cavities and cores for plastic molds. This method is one where castings are produced by pouring the molten alloy around a master steel pattern or hob, which is contained in a steel chase or frame, and applying pressure while the alloy is still in the molten condition. This allows the hot metal to flow evenly into the details of the hob (see Figure 1) and assures accurate reproduction of all detail. It also permits

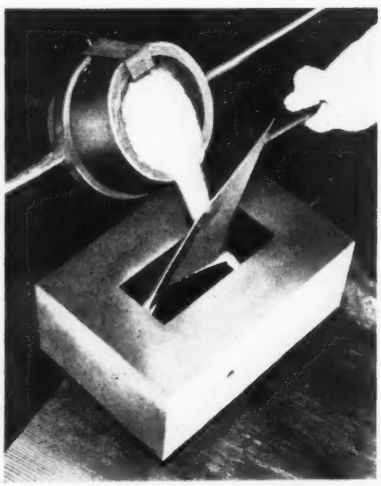


Fig. 1. Pouring Molten Beryllium Copper for Pressure Casting of Mold Cavities and Cores

the casting of cavities which could not be cold hobbed in steel without a prohibitive rate of hob replacement (see Figure 2). Many hours of machining are eliminated since the cavities have a finish commensurate with that of the original master hob.

For quite some time it was thought that high production rates and the molding efficiency of beryllium copper molds for plastics depended on the hardess of the cavities and cores, and Rockwell "C" readings of 50-60 were specified. This concept has since been proved erroneous. Many leading injection molders using pressure-cast beryllium copper cavities and cores have successfully completed production runs of three and four million parts with the alloy in the "as cast" condition having a Rockwell "C" hardness of 7-12.

Properties of Cast Molds

In the "as cast" condition pressure-cast beryllium copper has a tensile strength in excess of 105,000 psi.; tension impact strength of 12 foot-pounds; Rockwell "C" hardness of 7-12; electrical conductivity of 20% I.A.C.S.[2] and elongation of 2% in two inches. Although generally considered precipitation hardening, beryllium copper does not age harden at room temperature, but requires artificial means.

If the ultimate physical properties of the alloy are required, a simple one-step heat treatment is necessary. It is essential, however, that the castings be solution annealed prior to heat treatment. For annealing, we use an air circulaing or muffle-type furnace at a temperature of 1450-1475° F. The castings are placed in the furnace and held at temperature for three hours, following which they are removed and quenched in cold water.

To harden beryllium copper castings, they should be thoroughly degreased, placed into an air circulating or muffle-type furnace for three hours at 650° F., and then removed and allowed to cool in still air. The physical properties of the alloy after hardening are: tensile strength, 170,000 psi.; Rockwell "C" hardness, 40-45; tension impact strength, three foot-pounds; electrical conductivity, 25% I.A.C.S.; and elongation 2% in two inches.

Types of Hobs

Master hobs made of an air hardened steel are necessary in the pressure-casting procedure whenever a multiplicity of castings is desired, and in those instances where dimensional tolerance is paramount. This type of steel is required because of the casting process wherein the master hob is subjected to molten alloy and pressure at the same time. While no specific brand of air hardened steel is specified, the hot work steels in A.S.M. Class IV-B-2 are strongly recommended.

All pressure-cast beryllium copper castings are fabricated to the hob base size. On rectangular or square shapes it is recommended that the hob base be made not less than ⅛-inch larger on each side than the desired finished cavity to allow for cleaning operations. This is also true of the working surface of the hob where at least ½-inch should be allowed over the regular parting line, with as much radius as possible. The hob base should be approximately two inches thick and have several ½-13 holes drilled and tapped in the bottom of the base at principal bearing points. The hob should be hardened to Rockwell "C" 55-58 and polished as desired since the resulting castings will have a finish equivalent to that of the master hob. Bases on round hobs should be made ¼-inch larger than the diameter of the finished casting size, with the required tapped hole in the base.

There is a constant material shrinkage of the beryllium copper during pressure casting of 0.004-inch per inch, regardless of mass. If this dimensional shrinkage is compensated for during the fabrication of the master hob, casting tolerances of ±0.001-inch can be held.

Versatility of Beryllium Copper Molds

Pressure-cast beryllium copper castings

[1] President, Manco Products, Inc., 2401 Schaefer Rd., Melvindale, Mich.
[2] International Annealed Copper Standard.

Fig. 2. Typical Beryllium Copper Castings for Plastics Molding Include Cavities Impracticable or Impossible with Cold Hobbed Steel

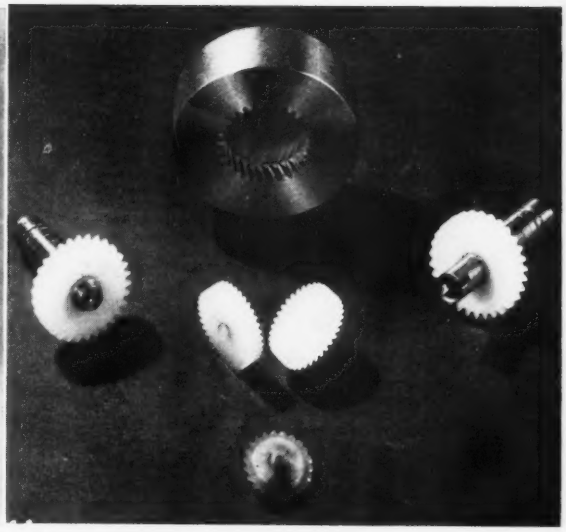


Fig. 3. Beryllium Copper Castings Used to Mold Helical Nylon Gears

which have been hardened offer an unusual feature; ease of adaptation to engineering changes or design alterations. Should an engineering change be deemed necessary after a portion of the production order has been molded, the castings can be removed from the mold, reannealed to a soft condition, and sent to the die shop for changes. They can then be rehardened and replaced in the mold without any loss in the basic physical properties of the alloy.

The technique of casting beryllium copper from beryllium copper also widens the scope of the mold maker and allows him to produce cavities and cores for his mold from a single master hob, thus permitting quicker deliveries and hob economies. By utilizing this process it is unnecessary for the mold maker to supply both a core hob and a cavity hob for his job if the plastic item has a uniform wall thickness. Instead, he can furnish either the male or female hob, whichever is more economical to produce.

Should a male hob be supplied, the cavities necessary for the mold are fabricated, and an extra casting also made. This extra casting is then used as a master hob to produce the corresponding cores for the job. The wall thickness of the plastic part to be molded can be held to blueprint tolerance only at the bottom or horizontal plane of the cavity. To provide proper part wall thickness tolerance on the vertical plane, some hand-operations must be performed. Since this technique involves two casting processes, it must be borne in mind that total dimensional shrinkage with this technique will be 0.008-inch per inch.

Other Applications

Beryllium copper pressure castings are now being used in many applications other than plastic molds. Many zinc die casting producers have stated that excessive flash on their pieces was eliminated, and production runs of up to one-half million pieces were reported with the use of beryllium copper mold castings. These castings have been used in both the "as cast" and "age hardened" conditions, with excellent results, but were chrome plated in all cases. The use of beryllium copper in zinc die casting more than offsets the need of slightly higher die maintenance costs when conditions demand fidelity of detail and a hardware finish on the final zinc pieces.

Beryllium copper castings have also been used successfully as trim dies for zinc die castings, with startling results. In addition, short runs of up to 10,000 pieces have been made with aluminum die castings even though beryllium copper is not recommended for such application.

Another recent development is the use of beryllium copper castings as deep draw stamping and embossing dies. The cavities and forces are made by the usual pressure casting method, then hardened, and polished. Owing to the high abrasive qualities of the alloy, it has been found that thin sheet materials ranging from silver to stainless steel can be stamped successfully with pressure-cast beryllium copper dies. The stamped pieces show a finer degree of detail than obtained with steel dies, and the alloy dies have far surpassed the steel dies in longevity for the same application.

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The use of pressure-cast beryllium copper castings for the molding of nylon helical gears has greatly enhanced the versatility of the gear manufacturer (see Figure 3). The tailored specifications provided by the alloy coupled with exacting quality control have promted many molders of nylon gears to abandon their previous methods of producing gear cavities in favor of beryllium copper castings.

Advantages of Beryllium Molds

The advantages offered the user of pressure-cast beryllium copper in his molds are as follows:

(1) The relatively high thermal conductivity of the alloy promotes faster dissipation of heat during injection molding, resulting in shorter molding cycles and higher production rates.

(2) The high thermal conductivity also saves at least 40% of the elapsed time from mold set-up to production since beryllium copper will heat up to molding temperatures more rapidly than steel.

(3) Molds containing beryllium copper castings can be stored without lubrication or rust preventatives owing to the noncorrosive properties of the alloy. Time is again saved since it is not necessary to cleanse the mold from oil or grease prior to putting it back into production.

(4) The high-tension impact of the alloy enables it to withstand far greater shocks than does steel.

(5) When cast under pressure, beryllium copper has exceptional flow characteristics, readily filling the most minute detail on the master hob and giving clean, sharp fidelity to the resulting cavity.

(6) A homogeneous uniformity is present in the alloy casting after hardening, and there is no soft core as with steel.

(7) The hardening characteristics of the alloy are a distinct advantage to the plastics molder since his normal molding temperatures tend to approach the hardening range of the alloy (650° F.). Consequently beryllium copper cavities and cores for plastic molds remain stable during the molding cycle, and longevity is assured.

While no claims are being made that beryllium copper is a panacea for all plastics molding ills and problems, the plastics industry has found the many attributes of the alloy to be of great advantage in many critical molding programs.

U. S. Rubber (Royalite Sales), Monsanto, and Goodrich Chemical Exhibits at the National Plastics Exposition

Fifth National Plastics Exposition Huge Success

THE fifth National Plastics Exposition, sponsored by The Society of the Plastics Industry, Inc., was held March 11-14 in Convention Hall, Philadelphia, Pa. One of the most highly successful in the series, the exposition had as its slogan, "Plastics Personify Progress." The continuing growth of the industry was reflected by the fact that the show included the exhibits of at least 16 firms making their first appearance at any plastics exposition. Although restricted to members of the industry, total registration was 17,922 persons, against 12,800 at the last show in 1950.

Materials manufacturers and suppliers, machinery and equipment manufacturers, molders, fabricators, and other branches of the industry were represented among the 137 exhibitors. A total of 193 booths comprised the exposition, covering more than 43,700 square feet of floor space. The international flavor of the exposition was shown by the attendance of 75 persons, representing 23 foreign countries, at the International Guests Reception Center.

Materials Suppliers

American Cyanamid Co., which displayed a wide range of products made from its Melmac, Laminac, and Beetle resins, featured a four-part sports car body made from Laminac reinforced with glass fibers. Ampacet molding powders and products made therefrom were exhibited by American Molding Powder & Chemical Corp. Organic colors for use in plastics were shown by Ansbacher-Siegle Corp. New applications of its resins and new materials were stressed in the Bakelite Co. exhibit, including new rubber-polystyrene plastics, a foaming Vinylite plastisol, a new Army Signal Corps carrier cable, railway tie pads made from resin-impregnated abaca fiber, phenolic molded furniture drawers, and new wall coatings. The A. Bamberger Corp. exhibit described the company's plastics scrap reprocessing services.

Products illustrating the properties of Durite phenolic molding compounds and industrial resins were shown by Borden Co.; while the Catalin Corp. of America presented typical applications of its resins and molding powders. Under the theme, "Up to Date on Acetate," Celanese Corp. of America displayed new acetate products, including panel screens, advertising transparencies, and toys. The properties and applications for its Araldite ethoxyline resin-type coating, casting, and adhesive compounds were shown by Ciba Co., Inc. Cordo Molding Products, Inc., featured dry process molding materials for reinforced plastics.

Dow Chemical Co. had on view the manufacturing and sales services offered with its Styron polystyrene plastic; while other displays were devoted to saran and Ethocel products. New applications for nylon, Teflon, Alathon, and Lucite were shown by E. I. du Pont de Nemours & Co., Inc., which also gave a series of illustrated talks on case histories of product applications. In displaying its phenolic materials, Durez Plastics & Chemicals, Inc., emphasized a new compound sufficiently conductive to be electroplated by conventional techniques. Colorants for plastics were shown by Ferro Corp.

A group of four Exon vinyl resins in commercial production, as well as four resins in pilot-plant production, was featured by Firestone Plastics Co. Pre-Imp and Dryply glass-polyester molding compounds and typical products were exhibited by Flexfirm Products. Besides applications for its fast-cure phenolic and its rubber-phenolic molding materials, General Electric Co. exhibited a new rubber-phenolic varnish for lamination use and new designs in its Textolite Monotop plastic surfacing. Thermoplastic molding compounds, Drycol colorants, and Ger-Bond adhesives were shown by Gering Products, Inc.

While revealing applications of its Geon vinyl materials, B. F. Goodrich Chemical Co. demonstrated the dip coating of nuts with a plastisol formulation. Goodyear Tire & Rubber Co. exhibited applications of Pliovic vinyl copolymer in a wide range of products. Hardesty Chemical Co., Inc., displayed Harflex vinyl plasticizers. The Hercules Powder Co. exhibit featured the company's plastics services and the Hercoflex vinyl plasticizers. Samples of absorbent papers for use in laminates were shown by Hurlbut Paper Co. Product applications for its Kel-F plastic were displayed by M. W. Kellogg Co.; while typical uses for polystyrene were shown by Koppers Co., Inc. Both standard and special-purpose phenolic compounds were exhibited by Loven Chemical of California.

While featuring a "Spectrum Mobile" pointing up its color service by showing 48 products in different colors, Monsanto Chemical Co.'s exhibit announced three new materials: Lustrex LH, a medium impact styrene with good gloss; Resinox GP-1000, an all-purpose phenolic with improved molding features; and Lustrex X-700 resins, a new series of water soluble, modified styrene polymers. National Lead Co. displayed its Dutch Boy vinyl stabilizers and Bentone additives. While featuring a Vibrin plastic-glass fiber body for sports cars, Naugatuck Chemical Division, United States Rubber Co., also announced the development of Kralastic J, a styrene copolymer which retains its toughness and high impact strength at —60° F., and of a blow extrusion process for making transparent vinyl film in thicknesses of 0.001-inch or less.

The Owens-Corning Fiberglas Corp. exhibit of typical applications included showings of a new sound-color film, "The Magic Marble," depicting the manufacture of Fiberglas and its use in plastics. Pittsburg Coke & Chemical Co. featured the "coal-to-plastics" story of the manufacture and use of its plasticizers. The moldings of its alkyed resins and typical applications were demonstrated by Plaskon Division, Libbey-Owens-Ford Glass Co. Properties and uses of its plasticizers were featured by Reichhold Chemicals, Inc. Rohm & Haas Co. presented typical applications of its acrylic plastics. Resins for compounding, casting, coating, and cementing were shown by Synvar Corp. The Tennessee Eastman Co. exhibit included a production-scale extrusion of Tenite piping. Wood flour filler materials were displayed by Wilner Wood Products Co.

Machinery Manufacturers

New machinery for the plastics industry was shown by four companies. Improved Paper Machinery Corp. demonstrated a new Model HA4-175 four-ounce injection machine and announced new designs in its larger machines as well as a new Model #3 temperature regulator for injection molds. Jackson & Church Co. announced new six- and 16-ounce preplasticizing injection machines as additions to the previous line of 48-, 72-, and 200-ounce machines. A new 34-ounce Model #70 horizontal injection molding machine was shown in operation by Moslo Machinery Co. as an addition to the Minijector line. John Waldron Corp. demonstrated its new plastic embosser and announced a new Ecco roll coater.

Other machinery and equipment exhibits were as follows: American Wheelabrator & Equipment Corp., Tumblast cleaner for plastic parts; Art Roll Leaf Stamping Co., stamping, printing, and silk screening machines; Baldwin - Lima - Hamilton Corp., demonstration of Baldwin-Defiance preforming presses; Conforming Matrix Corp., spraying masks and fixtures; Dilts Machine Works, winders, coaters, and embossers; Distillation Products Industries, vacuum metallizing equipment; Fellows Gear Shaper Co., demonstration of injection molding machine; Foremost Machine Builders, Inc., scrap cutter; Harco Industries, Inc., manual laminating press; Honan-Crane Corp., oil purifiers; Hydraulic Press Mfg. Co., preplasticizing injection machines; Industrial Mfg. Corp., mold heating systems; Industrial Ovens, Inc., web coating and handling equipment; Instron Engineering Corp., testing machines; W. T. LaRose & Associates, Inc., dielectric preheaters; Lester-Phoenix, Inc., demonstration of injection machine; and Lewis Welding & Engineering Corp., Model 4 injection machine.

Mayflower Electronic Devices, Inc., dielectric sealers; Modern Plastic Machinery Corp., extruders and heat controllers; J. M. Nash Co., deflashing lathes; National Research Corp., vacuum metallizing equipment; National Rubber Machinery Corp., extruders and accessories; New Hermes Engraving Machine Corp., engravers; Radio Receptor Co., Inc., dielectric sealers and preheaters; Reed-

Prentice Corp., injection machines; Reeves Pulley Co., Inc., drives and speed controls; Roehlen Engraving Works, Inc., embossing rolls; Sill Industries, heaters and forming machines; Singer Sewing Machine Co., dielectric seamers; F. J. Stokes Machine Co., molding machines, compounding extruders, and vacuum metallizing equipment; Taco West Corp., instruments; Watson-Stillman Co., injection machines; Welding Engineers, Inc., compounding extruders; and Edwin L. Wiegand Co., electric heating elements.

Molders and Fabricators

Injection molders exhibiting at the show included Amos Molded Plastics; Chicago Molded Products Corp.; Consolidated Molded Products Co.; Eldon Mfg. Co.; Erie Resistor Corp.; General American Transportation Co.; A. L. Hyde; Mack Molding Co., Inc.; Nylon Molded Products Corp.; Plastimold Corp.; Watertown Mfg. Co., Inc.; and Westchester Plastics, Inc. Film and sheeting fabricators were represented by Bolta Co.; Respro, Inc.; Ross & Roberts Sales Co.; and Shawray Plastics Corp. Plastics fabricators and formers at the show included Amplex Mfg. Co.; CrystalX Corp.; Steiner Plastics Mfg. Co.; Royalite sales division, U. S. Rubber; and Van Dorn Iron Works.

Extruders exhibiting included Anchor Plastics Co., Inc.; Plax Corp.; Surprenant Mfg. Co.; and World Plastex. Laminated products were shown by Farley & Loetscher Mfg. Co.; Parkwood Laminates, Inc.; Russell Reinforced Plastics Corp.; St. Regis Sales Corp.; and Westinghouse Electric Co. Low-pressure moldings were displayed by Apex Electrical Mfg. Co.; Bassons Industries Corp.; Camfield Mfg. Co.; Dynakon Corp.; and Polyplastex United, Inc.

Other exhibits of molding and fabricating were: Coating Products, metallized plastics; Cordo Chemical Corp., vinyl coated glass fabrics; G. Felsenthal & Sons, Inc., molded instruments; Fiberite Corp., thermoset moldings; Garlock Packing Co., plastic packings; Hy-Sil Mfg. Co., plated plastics; Interchemical Corp., coated fabrics; Lumite Division, Chicopee Mills, Inc., woven saran fabrics; Marblette Corp., cast phenolics; Molded Products Corp., custom molding; and Northern Industrial Chemical Co., general molding.

Other Exhibits

Exhibits of accessory services included those of Avery Adhesive Label Corp., labels and label dispensers; B. Blacher, custom slitting and sheeting; Manco Products Corp., beryllium copper cavities; J. F. Motson Co., custom printing on plastics; Omni Products Corp., export distribution services; and South Florida Test Service, exposure tests.

D-20 on Plastics Holds Spring Meeting

THE spring meeting of Committee D-20 on Plastics, American Society for Testing Materials, and its subcommittees was held at the Benjamin Franklin Hotel, Philadelphia, Pa., February 25-27. Chairman Gordon M. Kline, National Bureau of Standards, presided over the meeting, and Bruce L. Lewis, Tinius Olsen Testing Machine Co., was secretary.

Advisory Committee Meeting

The D-20 advisory committee met the evening of February 26. E. B. Cooper, E. I. du Pont de Nemours & Co., Inc., who reported on the activities of the International Standards Organization Committee TC/61 on plastics, said that the committee has decided to hold a meeting directly after the Third International Congress on Plastics, which will be held in Turin, Italy, in October.

It was reported that the plastics symposium to be given at the ASTM annual meeting in June in New York, N. Y., will comprise 7-8 papers. P. J. Smith, of the Society staff, reported that a new compilation on plastics methods, to be published before the annual meeting will be available at that time. The fall meeting of D-20 is scheduled for Boston, Mass., during the last week of October.

Committee D-20 Meeting

R. K. Witt, Johns Hopkins University, presided over the D-20 meeting on February 27. It was decided to send the following methods to a letter ballot of committee members to advance them to standards: D790-49T (flexural properties); D864-45T (coefficient of thermal expansion); D1003-49T (haze and luminous transmittance); and D697-42T (water vapor permeability of sheets). The following methods were reaffirmed as standard methods: D732-46 (shear strength); D673-44 (mar resistance); D568-43 (flammability of thin films); D635-44 (flammability of thicker sheets); D696-44 (coefficient of linear thermal expansion); D494-46 (acetone extraction of phenolic plastics); and D675-45 (descriptive nomenclature for plastic parts).

The "melt indexer" method for polyethylene is being sent to a simultaneous letter ballot of D-20 and Subcommittee 3. The proposed method for volatile loss from plastics has passed the letter ballot and is being sent to the Standards Committee. The method concerning an apparatus for determining volatility of plastics has been sent to the Executive Committee on Laboratory Equipment. It has been decided to revise the following specifications: D700-49T (phenolic molding compounds); D787-46T (ethyl cellulose molding compounds); and D708-50 (dioctyl phthalate plasticizers). It was decided to send the new method on cellulose acetate for primary insulation, and D883-51T (definitions of plastics terms) to letter ballot of D-20.

At the end of the meeting election of new officers took place under the direction of Nominating Committee Chairman M. E. Marks, Columbia-Southern Chemical Corp. The following officers were unanimously elected to two-year terms: chairman, Professor Witt; first vice chairman, W. A. Zinzow, Bakelite Co.; second vice chairman, F. W. Reinhart, NBS; membership secretary, Mr. Lewis; and secretary, Gerald Armstrong, Tennessee Eastman Corp.

Subcommittee Meetings

Subcommittee 1—Strength Properties of Plastics. Mr. Marks, chairman. C. H. Adams, Monsanto Chemical Co., reported that a round-robin is under way to test a new method on rods and tubes. The round-robin study on films has been completed, and considerable revision of Method D882 is expected. M. Wirick, Hercules Powder Co., reported that many companies are cooperating in the ski-ball impact test, and the work will be finished soon. Alex Yordiadis, Sonntag Scientific Corp., reported considerable progress on developing a round-robin study of dynamic properties.

Subcommittee 2—Hardness of Plastics. L. W. A. Meyer, Tennessee Eastman, chairman. Results obtained in the recent round-robin on the Taber abrader were discussed. It was shown that while not so accurate as could be desired, the method is useful for determining abrasion characteristics. Work is proceeding on the investigation of mechanical abrasion methods.

Subcommittee 3—Thermal Properties of Plastics. Mr. Cooper, chairman. It was reported that 14 flammability testers have been constructed in accordance with SPI specifications. A method has been written and will soon be ready for letter ballot. The heat distortion test is being revised to give proper results for polystyrene by inclusion of a special conditioning procedure to relieve stresses. Tests are also being made to determine the effect of sample size on heat distortion characteristics.

There do not appear to be any adequate methods for determining the maximum use temperatures of plastics, and the subcommittee decided to work on this problem. The round-robin study on the brittle temperature test gave results that were not too reproducible, and it was decided to run a new round of tests. In accordance with the wishes of D-11 on rubber, it was decided to state in the method that hinge breaks are failures.

Subcommittee 4—Optical Properties of Plastics. H. K. Hammond, NBS, chairman. The problems involved in determining color differences between plastics are to be investigated, and it is hoped that an instrument can be developed to do this operation without the use of standard colors. In discussing the abrasion resistance of optical plastics where haze is determined by an integrating sphere, it was brought out that internal haze is difficult to determine. R. S. Hunter, Henry A. Gardner Laboratories, reported on the progress of methods for determining gloss. D523 is now used for measuring gloss in the middle range of values, and methods for determining gloss in the high and low ranges are being investigated.

Subcommittee 5—Permanence. W. C. Goggin, Dow Chemical Co., chairman. R. C. Boyd, Bakelite, reported that the activated charcoal method for determining volatility loss of vinyl chloride plastics has passed a letter ballot of D-20 and will be sent to the Standards Committee. The compartmented oven method has been sent to the Executive Committee on Laboratory Equipment. J. J. Lamb, NBS, reported that the new method for determining the effect of chemicals on vinyl plastics is being written and will soon be sent to a letter ballot of D-20. The subcommittee has authorized a new check on outdoor weathering and will cooperate with the SPI and the government in setting up test programs for weathering plastics in the field.

Subcommittee 6—Specifications. L. Gilman, Picatinny Arsenal, chairman. It was decided to revise various specifications, as listed in the preceding report of the Committee D-20 meeting.

Subcommittee 7—Analytical. D. E. Northrup, Tennessee Eastman, chair-

man. D1004 on analysis of plasticizers will be kept as a tentative method, and further work is continuing on various phases of this subject. A round-robin study is under way on the testing of vinyl molding powder.

Subcommittee 8—Research. C. R. Stock, American Cyanamid Co., chairman. Two papers were presented: "Some Observations on Crazing of Acrylic Plastics," W. C. Wolock, NBS; and "Use of Statistics in Chemical Experimentation," L. R. Perkins and W. L. Gore, du Pont. Mr. Wolock noted that fractures always occur in the direction of the applied tensile strength, and that crazing can be caused by tensile strength and/or solvent action. Crazing occurs at 90% of the total strength in the case of tensile strength, and at 30% of the total stress in the case of solvent action. A method for producing biaxial stresses within thermoplastics was shown, and it was claimed that no crazing occurred with solvent treatment when high biaxial stresses were present.

Mr. Gore's paper discussed the use of statistics by plastics technicians. One of the most important uses of statistics is in the design of experiments, and the use of Latin squares for such was described.

Subcommittee 10—Definitions. C. H. Alexander, B. F. Goodrich Chemical Co., chairman. Several terms relating to plastics were discussed. Definitions of tensile terms have been sent to the appropriate E-1 subcommittee and are expected to replace the present E636. It was reported that Professor Witt has developed a six-digit number system for distinguishing type of plastics test, type of conditioning, and direction of testing.

Subcommittee 14—Conditioning. A. C. Webber, du Pont, chairman. Work is being done with the government to set up standard conditioning temperatures. A new section has been set up for investigating and maintaining relative humidity. Test methods are to be set up for the specification of equipment to obtain and maintain various temperatures.

New Monsanto Plant

THE completion of a new plant at Santa Clara, Calif., to manufacture butylated melamine and urea resins was announced by Monsanto Chemical Co., St. Louis, Mo., through Edward Schuler, general sales manager of the western division. To be marketed under the trade name Resimene, the resins are used by the paint industry in the manufacture of fast drying, durable coatings for appliances and furniture. The new plant, the first of its type on the West Coast, will be a regional source of supply for these resins, previously shipped from Monsanto's Springfield, Mass., plant.

Monsanto also announced a 33% expansion of the research facilities at the plastics division's headquarters at Springfield, Mass. According to F. A. Abbiati, division general manager, 30 additional technically trained persons have been employed to provide the manpower required by the intensified research activities. A substantial part of the new facilities will be devoted to the company's new color research program. The expansion also provides for a surface coatings application laboratory, a physics laboratory, and a library of nearly 10,000 volumes and documents. Space in the expanded laboratory is set for the division's patent office.

SPI Holds Annual Conference at Philadelphia

THE 1952 annual conference of the Society of the Plastics Industry, Inc., was held March 12-14 at Convention Hall, Philadelphia, Pa. The conference was held in cooperation with the Wharton School of Finance & Commerce, University of Pennsylvania, and during the fifth National Plastics Exposition. A total of 495 members and guests registered at the conference, which consisted of morning and luncheon sessions and a reception on the evening of March 11 at the headquarters hotel, the Bellevue-Stratford.

Wednesday, March 12

The formal session consisted of talks by three members of the Wharton School faculty: "Modern Management Techniques," Robert P. Brecht, professor of industry; "Marketing's Contribution to the Value of a Product," Reavis Cox, professor of marketing; and "What Will Follow the Mobilization Build-Up?", Charles R. Whittlesey, professor of finance and economics. Dr. Whittlesey predicted that the mobilization peak, when it comes, will be more of a hump than a pinnacle. The point of maximum build-up will be reached at different times for different industries, and this will help ease the transition to a lower level of military spending. Moreover a lengthening out of the build-up period will also have the effect of reducing inflationary pressure now and the threat of a slump afterward.

A feature of the morning session was an OPS clinic where up-to-date information was provided on the rules and regulations issued by OPS. The SPI engineering and technical policy committee held a luncheon session at the Bellevue-Stratford, and discussed progress being made on the revision of the "SPI Handbook." A special meeting of the Society's membership committee was also held at the Belleville-Statford during the early afternoon.

Thursday, March 13

Four talks were presented during the formal session, as follows: "Industrial Relations in a Defense Economy," George W. Taylor, professor of industry, Wharton School; "Personnel Development," John R. Abersold, professor of industry, Wharton School; "What Makes a Star Salesman Tick?", William Crean, Lacy Sales Institute; and "The Use of Airless Blast Equipment for Deflashing Thermosetting Plastics," LeRoy J. Wieschhaus, American Wheelabrator & Equipment Corp.

Mr. Wieschhaus described his company's Tumblast, a centrifugal blasting machine of extreme flexibility for the deflashing of thermoset parts. The unit uses relatively soft, non-abrading pellets and consists of three principal components: (1) a rapidly rotating bladed wheel for hurling the pellets; (2) a work conveyor for efficiently moving the parts through the blast area; and (3) a pellet recycling system.

The SPI injection and compression molders divisions held a joint luncheon meeting. Subjects discussed at this meeting included the results of a survey of the financial operations of a number of representative molding companies; a discussion by SPI accounting committee members on whether tools are an operating expense or a capital investment for tax purposes; a forum on the certification regulation of electronic pre-heaters issued by the Federal Communications Commission; an open discussion of traffic rate and classification problems; and general division business affairs.

Friday, March 14

Four talks were given at the regular morning session, as follows: "Styrene Compounds as New Tools for Industry," Frazier Groff, Bakelite Co.; "High Vacuum Metallization of Plastics," Alvin H. Hartman, Distillation Products Industries; "Techniques Used in the Fabrication of Polytetrafluoroethylene Resins," Wilton A. Hawkins, E. I. du Pont de Nemours & Co., Inc.; and "New Horizons in Rigid Thermoplastics," D. Lorin Schoene, Naugatuck Chemical Division, United States Rubber Co.

Mr. Groff's talk dealt with four new or relatively recent developments in modified styrenes for applications where the mechanical or chemical properties of regular injection molded styrenes proved unsatisfactory. These developments are (1) a copolymer of styrene and acrylonitrile with superior chemical resistance, outdoor weather, and mechanical properties; (2) a styrene of controlled polymer distribution that gives monofilaments having good dimensional stability at elevated temperatures; (3) rubber plasticized polystyrenes of high impact strength and greater ductility without serious drop in heat distortion point; and (4) modified styrene which can be injection molded by special techniques to give phonograph records comparable to vinyls in fidelity and wear properties.

Mr. Hartman gave a detailed description of the high vacuum metallization technique for plastics, including pretreatment of the parts, characteristics of undercoatings, the evaporation and condensation process in metallization, and use of top-coatings. Typical examples discussed included single-side and all-over metallized molded parts, and metallized non-rigid films and sheeting made of acetate, polystyrene, and vinyl.

Mr. Schoene predicted that future developments in rigid thermoplastics will include a much wider use of resin-rubber blends. Modifying a styrene-acrylonitrile resin with a butadiene-acrylonitrile rubber gives a marked increase in toughness with very little sacrifice in hardness and heat distortion of the resin. These improved properties are shown by the Kralastics, a series of molding and extrusion compounds made by varying the monomer ratios and blending proportions of the rubber and resin. While a full range of colors can be obtained in the finished blends, they are opaque and cannot be used where transparency or translucency is required. A new development in the series is Kralastic J, a high impact blend which retains its toughness with virtually no loss down to —40° F., and with only a moderate decrease down to —60° F.

The SPI melamine tableware committee held a luncheon-meeting to discuss plans for an educational project to acquaint users with appropriate detergents and their use on the plastic tableware. A luncheon-meeting was also held by the Society's polystyrene wall tile committee to review the recently issued standard in the light of continuing statistical data which are being accumulated by the committee.

Acetate Sheet Expansion

NEW sources of raw materials and expanded processing facilities made possible a 100% increase in the production of extruded cellulose acetate sheeting during the past year by Celanese Corp. of America, New York, N. Y., according to Edward W. Ward, general sales manager of the plastics division. Despite the current slowdown in the plastics industry as a whole, the company's sales of extruded sheeting are keeping pace with its expanded production, Mr. Ward said. The sales volume can be attributed to both government defense orders and the growing preference for acetate in many end-products formerly dominated by cellulose nitrate.

Recent engineering developments by plastics machinery manufacturers presage even greater increases in the use of acetate sheeting for low-cost, volume produced items such as transparent drug containers, spare parts boxes, and food trays. Recently introduced vacuum forming machines, utilizing a revolutionary method of drawing, are capable of forming cycles comparable to those of injection molding in speed, Mr. Ward declared.

Production of Celanese acetate molding compounds, drastically curtailed in the Spring of 1951 by the shortage of cellulose, has now been expanded to a point approaching output late in 1950, Mr. Ward also announced. This expansion was made possible by new sources of raw materials, especially the British Columbia plant operated by Celanese's Canadian affiliate for producing high alpha-cellulose. Expanded molding facilities at the Celanese plant in Belvidere, N. J., also contributed to the production increase.

New Vinyl Foaming Method

A NEW and economical method of foaming vinyl plastisol resins has been developed by Elastomer Chemical Corp., Nutley, N. J., in conjunction with work by Bakelite Co. The process produces a foam by expanding a special compound, based on Bakelite Vinylite plastisol resins, that cures at low temperatures and requires inexpensive equipment. Advantages of the foamed material include flame resistance, flexibility, light weight, and resistance to aging, moisture, abrasion, tearing, alkalies, acids, and most chemicals. Because of its inherent properties, the foam does not oxidize, dry out, or harden; has high resilience and elasticity; is practically odorless; and can be made in any color, it is also claimed.

This foam can be laminated directly to textiles and films, and laminates on Vinylite plastic film can be heat sealed or embossed either electronically or by heated rollers. The foaming process consists of three simple stages easy to control. Both the special foaming compound and the expanded material are stable. By changing the formulation or foaming process the density of the foam can be varied from 12-18 pounds per cubic foot, and the expansion from 400-800%. Similarly, almost any degree of hardness or softness can be obtained.

The three stages of the process are: (1) expanding the formulation with a gas in a pressure vessel; (2) discharging the expanded material into an open mold; and (3) curing the filled mold in an ordinary oven. The Elastomer formulation is poured into a pressure cylinder, and gas under a pressure of about 400 pounds is introduced to expand the compound. After being sealed off at this pressure the cylinder is vigorously agitated until the gas is partially absorbed into the plastisol. The expanded material, having a consistency of thick whipped cream, is then poured into the lightweight mold and cured at temperatures of 225-275° F. The expanded material retains its expansion in open air for as long as 90 minutes before curing. A tough skin that resists tearing and abrasion forms on all outer surfaces of the foam as it cures.

CALENDAR

Apr.	16.	Washington Rubber Group. Pepco Auditorium, Washington, D. C.
		New York Section SPE. Hotel Gotham, New York, N. Y.
Apr.	17.	Rhode Island Rubber Club. Metacomet Golf Club, East Providence, R. I.
Apr.	22.	Association of Consulting Chemists & Chemical Engineers. General Symposium. Belmont Plaza Hotel, New York, N. Y.
Apr.	25.	Detroit Rubber & Plastics Group, Inc., Detroit Leland Hotel, Detroit, Mich.
		Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Apr. 30- May	1-2.	Division of Rubber Chemistry, A. C. S. Cincinnati, O.
May	1.	Miami Valley Section, SPE.
May	6.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
May	7-8.	The American Institute of Chemists. Twenty-Ninth Annual Meeting. Hotel Commodore, New York, N. Y.
May	8.	Northern California Rubber Group.
May	9.	Connecticut Rubber Group.
		Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
May	14.	Newark Section, SPE. Military Park Hotel, Newark, N. J.
May	16.	Buffalo Rubber Group; Ontario Rubber Section. C.I.C. International Meeting. Hotel General Brock, Niagara Falls, Ont., Canada.
May	21.	Washington Rubber Group.
		New York Section, SPE. Hotel Gotham, New York, N. Y.
June	2-4.	The Chemical Institute of Canada. Thirty-Fifth Annual Conference and Exhibition. Mt. Royal Hotel, Montreal, P.Q., Canada.
June	9-21.	International Organization for Standardization. Triennial Meeting. Columbia University, New York, N. Y.
June	12.	New York Rubber Group. Annual Outing.
June	20.	Akron Rubber Group.
		Boston Rubber Group. Summer Outing. Andover Country Club, Andover, Mass.
June	23.-27.	American Society for Testing Materials. Annual Meeting. Statler and New Yorker Hotels, New York, N. Y.
June	26.	Rhode Island Rubber Club. Summer Outing. Metacomet Golf Club, East Providence, R. I.
June	27.	Detroit Rubber & Plastics Group, Inc. Golf Outing.
		Washington Rubber Group. Golf Tournament. Annapolis Roads Club, Annapolis, Md.

SPE Sections Meet

DESPITE inclement weather 60 members and guests of the New York Section, Society of Plastics Engineers, attended the March 19 dinner-meeting at the Gotham Hotel, New York, N. Y. Featured speakers at the technical session, which followed a brief business meeting, were Harry H. Rains, Hofstra College and labor relations consultant, who discussed "Wage Stabilization Regulations — Their Effect on Small Business," and William Nussbaum, SPI accounting consultant, who spoke on "Cost Control in the Plastics Industry."

Professor Rains discussed wage stabilization regulations, emphasizing that they provide for flexibility when properly administered. Penalties for violations of the regulations are severe despite the fact that most violations are unintentional and based on ignorance. Most violators, however, can correct their mistakes by consulting experts in the field. The great need is for industry to administer properly the regulations itself and avoid unnecessary difficulties, the speaker declared.

Mr. Nussbaum's talk dealt with the problems common to engineers and accountants in the plastics industry, and he described how the service of both groups is necessary for setting up proper cost control systems. Closer cooperation between engineers and accountants is needed to set up uniform accounting practices and thereby achieve standardization in the industry.

Table favors were distributed through the courtesy of H. G. Jacobs Mfg. Co. and Rotuba Extruders, Inc., and the meeting closed with a drawing for door prizes contributed by Dusal Tool & Mold Co. and Norden Plastics Corp.

Du Pont Research Is Topic

Fifty members and guests attended a joint dinner-meeting of the Chicago Section, SPE, and Midwest Chapter, SPI, on March 12 at the Builder's Club, Chicago, Ill. Martin L. Shaw, E. I. du Pont de Nemours & Co., Inc., gave a talk on research at du Pont in conjunction with a showing of the company's color film, "The Story of Research." Current officers of the Chicago Section, elected by letter ballot, were announced as follows: president, Maurice Meltzer, Service Plastics Co.; vice president, John T. Bent, Tennessee Eastman Corp.; and secretary-treasurer, Victor E. Sorrell, Bakelite Co.

Visit Formica Plant

The March 6 dinner-meeting of the Miami Valley Section, SPE, was held at the new Evendale, O., plant of the Formica Insulation Co. Approximately 97 members and guests of the group attended the meeting, which consisted of a tour of the plant and a talk by John Pitzer, the company's chief specification engineer. Mr. Pitzer described the various laminating and low-pressure molding techniques used by the firm and displayed samples of different products for the automotive and home furnishings industries.

Scientific and Technical Activities

Rubber Division, A. C. S., Cincinnati Spring Meeting

THE spring meeting of the Division of Rubber Chemistry of the American Chemical Society will be held at the Netherlands Plaza Hotel, Cincinnati, O., April 30, May 1 and 2, with the Southern Ohio Rubber Group acting as host. Waldo L. Semon, B. F. Goodrich Research Center, chairman of the Division, will preside.

A luncheon-meeting of the Division's 25-Year Club will take place Wednesday noon, April 30. Chairman for this meeting will be A. C. Eide, American Zinc Sales Co. The Division banquet will be held the evening of May 1.

The local committee in charge of arrangements is composed of Stewart L. Brams, Dayton Chemical Products Laboratory, chairman; Don N. Bertke, Texo Corp., treasurer; with Jack E. Feldman, Inland Mfg. Division, General Motors Corp.; and Louis J. Keyes, Dayton Rubber Co., as members of the steering committee, C. L. Zimmerman, C. L. Zimmerman Co., printing and publicity; Samuel J. Miller, Dubois Co., meeting rooms and equipment; Bob Feldhaus, Amsco Solvents & Chemicals, Inc., banquet and entertainment; and R. J. Hoskins, Inland, registration, are subcommittee chairman in charge of the indicated activities.

The technical session which begins on the afternoon of April 30 include papers on the new du Pont synthetic elastomer "Hypalon" and on oxygen and ozone aging and measurement and on the new Alfin polymers. Abstracts of the 24 papers to be presented together with the authors and their affiliations follow.

Abstracts of Papers

WEDNESDAY AFTERNOON—APRIL 30

2:00 p.m.—**1. Introductory Remarks.** Waldo L. Semon.

2:10 p.m.—**2. Chlorosulfonated Polythene. I. A New Elastomer. R. E. Brooks,** D. E. Strain, A. McAlevy, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

A new du Pont elastomer is made by treating polythene with chlorine and sulfur dioxide. It can be compounded and processed on conventional rubber machinery. The outstanding characteristics of properly formulated and cured products are: (1) excellent abrasion resistance, and (2) unusual durability on exposure to ozone, oxygen, heat, and the weather. Therefore chlorosulfonated polythene is expected to find application in such diverse articles as tire treads, white sidewalls, wire and cable covering, coatings, mechanical goods and protective films.

The ultimate structure of an elastomer derived from polythene depends on the molecular weight of the parent polythene and on the chlorine and sulfur contents. When chlorine, but no sulfur, is introduced into the polymer, it remains a thermoplastic. Chlorinated polythene containing 30-35% chlorine is a soft material of low strength; while chlorinated polythene containing 60-65% chlorine is tough and stiff. Chlorosulfonated polythene with 1.3-1.7% sulfur and 26-29% chlorine gives the best balance of properties for a general-purpose elastomer. Physical properties of typical cured compositions are discussed in relation to particular fields of application. The combination of high tensile strength and high modulus without the use of carbon black is unique in synthetic elastomers.

2:35 p.m.—**3. II. Metal Oxide Curing Systems. M. A. Smook,** I. D. Roche, W. B. Clark, O. G. Youngquist, du Pont.

Chlorosulfonated polythene is a completely saturated elastomer, depending primarily on reactive sulfonyl chloride groups for cure. Most practical curing systems for this polymer are based on a polybasic metal oxide which reacts to give a metal sulfonate cross-link. The first step in the curing mechanism appears to be the hydrolysis of the sulfonyl chloride group to the free acid. Water and other hydroxyl-containing compounds accelerate the curing reaction; while desiccants inhibit it. Since free hydrochloric acid is evolved during the hydrolysis step, acid acceptors must be available to neutralize it. Excess metal oxide in the curing formula is an efficient acid acceptor. However, only oxides giving water-insoluble chlorides give vulcanizates insensitive to water. Organic acids and accelerators are necessary components of a complete curing system in addition to metal oxides. The function of the accelerator is not known, but it may give a secondary cure through incipient unsaturation developed during the vulcanization.

The ozone resistance of chlorosulfonated polythene is independent of the compounding formulation used. Abrasion resistance, flex life, and high temperature tensile strength, however, are dependent on the kind and the amount of pigment used. In general, the clays or carbonates are equivalent to the best carbon blacks in improving these properties. Laboratory abrasion resistance (du Pont abrader) equivalent to the best cold rubber is obtained with carbonate-filled chlorosulfonated polythene compounds. Although the age resistance of most stocks without antioxidants is good, certain antioxidants, such as polymeric trimethyl dihydroquinoline, greatly improve resistance to degradation at high temperatures.

3:10 p.m.—**4. III. Organic Curing Agents. W. F. Busse** and M. A. Smook, du Pont.

Although chlorosulfonated polythene is normally cured through the formation of salt bridges between sulfonyl chloride groups on adjacent chains, the material may also be cured by other reactions and through other groups. Potential cross-linking reactions would include sulfonamide and sulfonic ester formation with polyfunctional amines and alcohols. When the elastomer is compounded with an aliphatic diamine like ethylene diamine, however, immediate reaction occurs on the mill, resulting in scorching. To determine the order of reactivity of a number of potential curing agents, their influence on the rate of gelation of chlorosulfonated polythene solutions in tetralin was studied over a range of temperatures.

From the gel work it was possible to detect changes in viscosity indicative of cross-linking and from these changes to select some eight to ten classes of compounds which showed curing activity. Representatives of these classes were then screened by conventional milling and curing techniques. Some of the best vulcanizates were obtained from aromatic diamines such as benzidine, thiourea and its derivatives, aliphatic and cyclic dioximes, thiurams, and carbamates. If the hydrochloric acid evolved is not tied up in an insoluble compound, the cured samples will absorb water on soaking. In some cases the addition of carbon black improved the properties of the vulcanizates, and in all cases calcium carbonate improved the strength. Probably the carbonate functions primarily as an acid acceptor rather than a reinforcing pigment. Chlorosulfonated polythene cured with these organic reagents tended to give higher elongations than cures with metal oxides and sometimes much higher tensile products which were equivalent to those of natural rubber.

3:35 p.m.—**5. Permeability of Rubber to Organic Liquids. Wm. J. Mueller,** Battelle Memorial Institute, Columbus, O.

Studies were made to determine the effect of three variables: namely, type of rubber, type of liquid, and temperature, on the permeability of synthetic rubbers to organic liquids. Tests were conducted at temperatures of 77, 130, and 180° F. The liquids used were diisobutylene, SR-6, methyl alcohol, methyl ethyl ketone, carbon tetrachloride, ethyl acetate, and benzene. The types of rubber were GR-S, "Thiokol," Paracril 18, 35, and neoprene. Thus 35 rubber-liquid combinations were investigated at three temperatures each.

Permeability was found to increase logarithmetically with temperature for each rubber-liquid combination. A qualitative relation was indicated between vapor pressure, permeability, and temperature, but results were not conclusive. Benzene usually had the greatest permeability through any given rubber; while diisobutylene and methyl alcohol had the lowest. The remaining liquids had an intermediate position.

In comparing the effect of the various rubbers, permeability through "Thiokol" was the lowest with all of the liquids. Polar liquids had the greatest permeability through the polar rubbers; while non-polar liquids had the greatest permeability through non-polar GR-S. Weakly polar neoprene had an intermediate position with all the test liquids.

Solubility of the liquid in the rubber was independent of temperature for each rubber-liquid combination. However an empirical relation between permeability and solubility was determined. This relation was $y = ax^{1.94}$, where y = specific permeability (oz.) (in.)/(24 hr.) (sq. ft.), and x = solubility of liquid in rubber (cc./gm.)

The constant "a" is a function of temperature and was found to be 3.8, 7.5, and 8.0 at 77, 130, and 180° F., respectively.

4:00 p.m.—**6. Relationship between the Modulus of Reinforced Rubber Compounds and the Physical Properties of Various Carbon Blacks. M. L. Studebaker,** Phillips Chemical Co. Akron, O.

The modulus of a rubber compound is

largely dependent upon the nature and the amount of pigment used. Carbon black is the most important pigment used by the rubber industry. Hence a study of the effect of physical properties of a carbon black upon the modulus of a rubber compound is of considerable interest.

Some recent theories attribute the modulus increase to (1) carbon-to-rubber bonds, and (2) carbon-to-carbon bonds. The forces involved could be of a chemical nature, or alternately they could involve forces of a van der Waals type. In this work a purely colloidal approach has been taken.

Forces of the first type were considered to involve the phenomena of wetting. Rubber was considered to be a hydrophobic material; hence, the hydrophobicity of the carbon black would determine the relative magnitude of these carbon-to-rubber forces. This hydrophobicity is almost completely determined by the ultimate analysis of the carbon black. Oil absorption, on the other hand, is largely determined by the carbon-to-carbon forces. Hence a relationship has been sought for and found among modulus, oil absorption, and the ultimate analysis of carbon black. Data are presented to illustrate this relationship.

Many variables affecting the results remain to be evaluated but the results obtained so far give strong support to the colloidal approach.

THURSDAY MORNING—MAY 1

9:00 a.m.—7. **Alkaryl Sulfonates as Conditioners in Wet Twisting Cotton Tire Cord. J. C. Ambelang,** J. A. Shotton, G. W. Gottschalk, H. P. Stevens, G. E. P. Smith, Jr., Firestone Tire & Rubber Co., Akron.

Aqueous solutions of wetting agents and sizes have long been used in the twisting of cotton tire cord to facilitate operations and to increase the strength and other desirable properties.

Certain sodium alkaryl sulfonates have been found to be the most effective conditioners to apply to cotton cord in these processes. The cord so treated showed increased strength, achieved without loss in elongation if the elongation was not reduced too greatly by subsequent wet stretching. Outstanding in this class of conditioners were the sodium sulfonates of polyalkylnaphthalenes. Activity appeared greatest when the alkyl groups contained a total of at least 14 carbon atoms. In addition to a wetting action, sodium alkaryl sulfonates appeared to exert a binding action on the cord, similar to that of sodium rosinate, yet the cord retained a softer hand.

The sulfonates were made by the action of chlorosulfonic acid on analyzed samples of alkylnaphthalenes prepared for this study or separated by distillation from commercial products. The most effective cord conditioners were sulfonates prepared from hydrocarbons of high aniline point.

Parallel effects on cord were obtained from a series of sulfonated benzene homologs and a series of sulfonated alkylphenols. Highest cord strength obtainable from conditioners in the alkybenzene series appeared to be from sodium sulfonate of hydrocarbons over 250 in molecular weight; similarly, among the alkylphenols 230 appeared to be the minimum molecular weight.

9:20 a.m.—8. **Use of the Beta Ray Gage in the Rubber Industry. George B. Foster,** Industrial Nucleonics Corp., Columbus.

The beta ray gage is an industrial outgrowth of wartime research in atomic energy. It has made available to industry a versatile new tool for the measurement and control of the square yard weight and thickness of products produced in continuous sheet form. This new technique is of vital importance to the rubber, plastics, and paper industries in particular.

The instrument utilizes a beta emitting radioisotope as a low energy source of radiation of extreme stability. Strontium 90, until recently merely a waste product incident to a uranium fission, is most widely used because of its 25-year half life and nearly ideal energy spectrum. The source is mounted on one arm of a "C" shaped bracket, and an ionization chamber detector is mounted a few inches away on the other arm. The sheet material is allowed to pass between the two elements.

Variations in the square yard weight of the sheet passing through the gaging gap between the source and the detector produce corresponding changes in the indication obtained on a strip chart recorder, typically calibrated directly in square yard weight over ranges appropriate to the process.

The gage has met with an unprecedented and immediate acceptance in a wide range of industries because of the economics of its application. Material savings resulting from its use have permitted amortization of the instrument cost in as short a time as one month after installation. Savings exceeding $100,000 annually per machine have already been achieved by several companies using the gage. In processes where frequent specification changes are encountered the availability of accurate continuous measurement permits very rapid machine adjustments and a minimum of scrap. Also, the ability to hold close tolerances has permitted a lowering of nominal weight specifications.

The stability, accuracy, and reliability of this new measurement method have opened up whole fields of automatic machine control, giving great promise of further lowering costs and improving quality.

9:45 a.m.—9. **Hydrocarbon Composition of Rubber Processing Oils. Stewart S. Kurtz, Jr.,** and Charles C. Martin, Sun Oil Co., Norwood, Pa.

The purpose of this paper is to describe the types of hydrocarbon molecules present in rubber processing oils from petroleum and to give a brief outline of the method which can be used for getting such information.

Two types of hydrocarbon molecules are the major components of the oils: (1) aromatic hydrocarbons which vary in proportions of aromatic rings, naphthene rings, and paraffin side chains; (2) naphthene hydrocarbons which vary in proportions of naphthene rings and paraffin side chains. The concentration of paraffin hydrocarbons in dewaxed oils is very small.

Examples are shown of the properties and composition of three different oils having about the same average molecular weight as a commonly used oil extender: a "relatively aromatic" oil, a "relatively naphthenic" oil, and a "relatively paraffinic" oil.

Composition data obtained by the more rapid refractive index - density - molecular weight method are also shown on these oils. Agreement is good for fractions from naturally occurring crude oil, but not as good for some specially refined oils.

10:15 a.m.—10. **The Effects of Oils in Rubber. Ira Williams,** J. M. Huber Corp., New York, N. Y.

Information regarding the action of oil in vulcanized rubber is of particular interest since the advent of oil-extended GR-S. Oil present in vulcanized rubber separates the molecules and prevents bonding into a completely vulcanized mass. The same amount of oil diffused into unvulcanized rubber has a much less degrading action.

Butadiene rubbers have been produced in a diluted form by the use of modifiers which promote low molecular weight and non-rubber constituents. The direction of polymerization toward rubber polymers followed by sufficient swelling with oil to make it plastic should produce rubbers equal to those made by polymerizing in the presence of modifiers.

10:35 a.m.—11. **Reclaiming Agents for Synthetic Rubber. II.** H. E. Albert, J. C. Ambelang, **R. B. Bennett,** W. S. Cook, G. E. P. Smith, Jr., F. J. Webb, Firestone.

A previous communication from this laboratory,[1] reported the activity of alkylphenol sulfides as reclaiming agents, the most active were those derived from a trialkylphenol with the sulfide linkage placed in the *ortho* or *para* position. These materials are active in the so-called "neutral" reclaiming processes; however, they are inactive in the caustic processes, which were the most widely used processes before the advent of scrap containing synthetic rubbers.

In the present communication several N,N-dialkyl aromatic amine sulfides are reported, which were found to be active in both neutral and alkaline reclaiming processes. The most active of these were approximately equivalent in the neutral process to the best alkylphenol sulfide reclaiming agents previously reported.

It was concluded from the previous data that oxidative scission reactions, rather than the removal of combined sulfur, probably were the primary reactions involved in the reclaiming process, and that the alkylphenol sulfide might aid the scission reactions which take place during the oxidation of natural and synthetic rubbers.

Additional data now are reported concerning the activity of reclaiming agents in various types of sulfur cured and non-sulfur cured GR-S stocks. The activity of both alkylphenol sulfide and aromatic amine sulfide reclaiming agents was most pronounced in the sulfur cured stocks. These data indicate that the attack on or near the sulfide cross-links is the more important part of the reclaiming process.

Data also are shown which indicate that, under experimental conditions insuring the absence of oxygen the reclaiming agent has little activity, but in the presence of oxygen the activity of the combination to produce low molecular weight fragments of the GR-S vulcanizate is outstanding. Hence the reclaiming agent and oxygen work together, and both are necessary for maximum effectivness in scission of the GR-S vulcanizate. These results are discussed in terms of the possible reactions taking place during the reclaiming process.

11:00 a.m.—12. **Ebonite from *Hevea* Latex. R. Houwink** and J. W. F. van't Wout, Rubber Stichting, Delft, Holland.

The conditions for proper coalescence of the rubber globules and for the vulcanization of the gel obtained are discussed in connection with the pressure necessary for producing good mechanical properties of the ebonite formed. The technological characteristics of latex ebonite are com-

[1] W. S. Cook, H. E. Albert, F. L. Kilbourne, Jr., G. E. P. Smith, Jr., *Ind. Eng. Chem.*, 40, 1194 (1948).

pared with those of dry ebonite and of phenol formaldehyde materials. The properties of latex ebonite laminates with fabric filler and those of latex ebonite covers for metals are discussed. The economic aspects of latex ebonite applications are compared with those of dry ebonite and phenol formaldehyde materials, taking specially into consideration the cost of molds, fabrication series, and weight per article.

11:30 a.m.—**Business Meeting.**

THURSDAY AFTERNOON—MAY 1

2:00 p.m.—**13. Polymerization Stop-Agents. G. J. Autlfinger** and C. H. Lufter, B. F. Goodrich Chemical Co., Akron.

The free radical emulsion polymerization of butadiene and styrene used in GR-S manufacture must be shortstopped below complete monomer conversion in order to obtain maximum quality. This is accomplished by the addition of an agent which will destroy the initiator and terminate the free radicals propagating chain growth.

The commercialization of cold GR-S using redox initiation created many new shortstopping problems since the agents which had been in use for hot GR-S were generally ineffective for the new system. Many new compounds were tested; a few were found effective, but only at excessively high concentrations. It was reasoned that combinations of the promising shortstops would be more effective at lower total concentration. Sulfur in conjunction with reducing agents such as sodium dimethyl dithiocarbamate met this requirement. Sodium polysulfide proved to be equal to or better than sulfur in effectiveness and was more easily added to latex. A mixture of sodium dimethyl dithiocarbamate and sodium polysulfide has found commercial acceptance in many of the formulations for both cold and hot GR-S. Unusually low concentrations are effective.

The new shortstop combines many of the properties long desired for a universal shortshop for GR-S: (1) effectiveness in all commercial GR-S systems, (2) low cost, (3) low toxicity, (4) acceptability in non-discoloring light-colored rubber, and (5) ease of addition to the latex.

2:20 p.m.—**14. Physical Properties of Sodium-Catalyzed Polymers.** M. H. Reich, R. E. Schneider, **W. K. Taft,** Government Laboratories, University of Akron.

Work by Juve and Meyer indicated that a sodium-catalyzed 75/25 (charge ratio) butadiene/styrene copolymer prepared by C. S. Marvel exhibited superior mill processing, similar stress-strain, and a much better hysteresis-flex life relation than did emulsion polymerized GR-S made at 122° F. On the other hand, the low-temperature properties of the experimental elastomers were poorer than those of GR-S vulcanizates, as evaluated by brittle point values and Young's modulus determined at low temperature. To investigate this new type of polymer more completely, sodium-catalyzed polybutadiene and 90/10, 85/15, and 75/25 butadiene/styrene copolymers were prepared on a pilot-plant scale at the Government Laboratories and were compounded according to various test recipes.

Increasing the polymerization temperature from 86 to 188° F. did not appear to affect markedly the stress-strain, hysteresis, or rebound values at 212° F., but the low temperature properties were better for polymers prepared at the higher temperatures. As the amount of styrene in the charge formula was decreased from 25 to 0 parts for the sodium-catalyzed polymers made at 168° F., the tensile strengths decreased, but the hysteresis values were generally similar and in the range of that for natural rubber. The Gehman low-temperature properties improved from a freeze point of —26 to —47° C. with decreasing styrene content, and only the low-temperature flexibility of the sodium-catalyzed polybutadiene was comparable to that of GR-S.

The viscosity of the polymer, up to 95 ML-4, did not have a pronounced effect upon the physical properties of the polymer. At a loading of 30 parts of carbon black per 100 parts of polymer, stocks mixed with a high abrasion furnace black exhibited tensile strengths (2670 pounds per square inch) that were better and hysteresis values (22° F.) that were comparable to those stocks mixed with high modulus or semi-reinforcing furnace blacks. Incorporation of red lead during compounding improved noticeably the hysteresis of the sodium polymers, but yielded scorchy stocks. Morpholine disulfide (n-n'dithio bismorpholine) has been shown to be a means of controlling the scorchiness of the stocks.

For vulcanizates of blends of natural rubber and sodium-catalyzed 75/25 butadiene/styrene stocks compounded with 30 parts of a high modulus furnace black, about 70% of natural rubber was required to obtain stocks with reasonable hot tensile strength (860 pounds per square inch) and elongation (510%) at 212° F. The hysteresis of sodium-catalyzed polymers was improved by the incorporation of 10 or 20 parts of a rubber processing oil.

Processing and physical test results for this new type of elastomer now are made available.

2:45 p.m.—**15. Polymerization Reactions with Alfin Catalysts.** R. A. Stewart and **H. Leverne Williams**, Polymer Corp., Ltd., Sarnia, Ont., Canada.

Alfin catalysts, as developed by A. A. Morton, have been used for a study of the polymerization reactions of butadiene, styrene, and other monomers. Catalyst activity was affected by minor variations in the method of preparation and increased during the first few days of storage of the catalyst. Water, alcohols, and ketones acted as catalyst poisons.

Rapid rates of polymerization were achieved with butadiene, acrylonitrile, methyl acrylate, and methyl isopropenyl ketone, and slower rates with styrene, isoprene, dimethyl butadiene, alphamethyl styrene, vinyl pyridine, methyl methacrylate, and isobutylene. Copolymerization was obtained of butadiene with styrene, alphamethyl styrene, and 2-vinyl pyridine. Attempts to induce cross-linking by incorporation of vinyl crotonate or divinyl benzene in the polymers did not result in any tighter gel.

In the polymerization of butadiene is a threshold concentration of catalyst below which no reaction occurs, and above which the final conversion obtained rises rapidly with increased catalyst concentration to 100%. The threshold value is lower, the lower the concentration of inert diluents in the reaction system. The intrinsic viscosity of the polymer increases as reaction temperature is raised and decreases as conversion proceeds. In contrast, butadiene-styrene copolymers increase in intrinsic viscosity as conversion in increased and have a lower gel content.

It has been found that polymerization will occur in the presence of hydrocarbon oils, such as Circosol 2XH, and carbon black, although the catalyst requirements are thereby increased. Incorporation of such materials before or immediately after polymerization markedly improves the processability of the polymers. Physical evaluation of resulting masterbatches has indicated retention of desirable properties.

3:10 p.m.—**16. Bound Rubber Formation in Diene Polymers. P. B. Stickney,** E. E. McSweeney, W. J. Mueller, S. T. Palinchak, Battelle Institute.

Bound rubber is defined as the insolubilized portion of an uncured elastomer, after compounding with a filler. It is usually determined by static extraction, using the gel determination procedure. Therefore bound rubber and polymer gel cannot be distinguished directly.

The conditions leading to bound rubber formation in several butadiene polymers and copolymers were studied. It is initiated by mild static heating or milling at temperatures as low as 80° F. Milling leads to a much more rapid formation of bound rubber than does static heating. The rate of bound rubber formation during milling is temperature dependent, but there is a characteristic limit which is not exceeded below gel-forming temperatures for a given polymer-black system. The work of other investigators indicates that this limit is proportional to the gross surface loading of black.

When a black-loaded polymer is milled at gel-forming temperatures, bound rubber formation continues beyond the saturation value. This includes polymer gel formed simultaneously, but the effects are not simply additive; gel formation is apparently more rapid initially in a black-loaded stock than in unloaded polymer.

The effect of added antioxidants suggests that oxygen, presumably absorbed on the black, plays a direct part in bound rubber formation. The catalysis of the oxidation of iodide ion by carbon blacks is roughly proportional to their surface areas. It is significant that Graphon, a fine non-reinforcing black, does not catalyze the oxidation of iodide ion and does not form bound rubber.

On the basis of the work done it is postulated that bound rubber is chemically cross-linked polymer, which may be chemically combined with the black, or may simply mechanically include the black. It is postulated that the cross-linking reacton is initiated by an oxidation reaction catalyzed by carbon black.

3:35 p.m.—**17. Bound Rubber and Physical Properties of Diene Polymers. S. T. Palinchak,** E. E. McSweeney, W. J. Mueller, and P. B. Stickney.

A study was made to determine the effect of processing on bound rubber formation and the mechanical properties of the vulcanizates. For this study three polymers were investigated: polybutadiene, an 80-10-10 butadiene-styrene-isoprene terpolymer, and a 90-10 butadiene-styrene copolymer. These polymers were compounded with 50 parts of Philblack O, using three different processing sequences. One set of samples for each polymer was prepared by milling the polymer 30 minutes at temperatures varying from 100 to 320° F. The black was then quickly added on a cold mill, and compounding completed. A second set of samples was prepared by adding the black as quickly as possible on a cold mill, and post-milling for 30 minutes at the same temperatures used in the first series. A final set of samples was prepared by adding the carbon black uniformly during a 30-minute milling at the same temperatures. The further compounding of the latter two series was carried out as quickly as pos-

sible on a cold mill. A control, compounded quickly on a cold mill, was cured and tested for each polymer. All compounds were cured 50 and 100 minutes at 292° F.

In this work it was found that bound rubber was not affected by processing conditions where gelation of the polymer was avoided. The variations in mechanical properties observed were probably due largely to three factors: (a) polymer breakdown, (b) gelation, and (c) dispersion of the black. In practically every case studied it was found that the best properties were obtained for stocks in which carbon black was added very rapidly on a cold mill, and the stock given additional milling at a temperature of approximately 160° F. Low-temperature properties and abrasion resistance were affected more than the other properties by processing conditions. Coating of the carbon black with stearic acid improved low-temperature properties of polybutadiene without affecting greatly the other properties.

Some studies were made as to the effect of the type of carbon black on physical properties and bound rubber formation. In these studies Graphon and a partially devolatilized Spheron-6 were milled into polybutadiene. Graphon was found to form no bound rubber, but gave a tensile strength equal to that of Spheron-6 with polybutadiene. This stock, however, had a very low modulus and high elongation. Electron microscopic studies indicated that Graphon had a particle size equal to that of Spheron-6. However the effects of the two blacks on the properties of vulcanizates differ greatly. Photographs of these studies will be shown.

4:00 p.m.—**18. Lead, Copper, and Bismuth Oxides as Aids in the Vulcanization of Coprecipitates of Natural Rubber and Lignin. T. R. Griffith** and D. W. MacGregor, National Research Council of Canada, Ottawa, Ont., Canada.

No difficulty is experienced in the vulcanization of natural rubber containing lignin added as a dry powder, but this method of addition results in relatively low tensiles. When lignin solution was added to latex, however, the masterbatch obtained by coprecipitation was difficult to vulcanize. For example, if conventional acceleration was used, i.e., mercaptobenzothiazole with zinc oxide, test slabs were soft, tacky, logy and could be removed from the mold only with difficulty. Unpublished data on hand gave further evidence of similar trouble experienced by other experimenters in this field.

Although it is recognized that H_2S might be a necessary intermediate in the vulcanization reaction, published experimental evidence shows that an excessive concentration of H_2S retards vulcanization, even in the presence of powerful organic accelerators.

In order to test the possibility that the retardation of cure with lignin masterbatches might be due to excessive hydrogen sulfide developed during vulcanization, owing to reaction of sulfur with lignin, various metallic oxides were tried which it was thought might react with H_2S to form insoluble sulfide and so reduce the H_2S concentration. Lead oxides, copper oxide, and bismuth oxide were found successful with lignin masterbatches, particularly when used with a dithiocarbamate accelerator. Optimum quantities of these three oxides were seven, three, and seven parts, respectively, all based on 100 parts of rubber.

A thiazole-type accelerator and zinc oxide were retained in the formulation in order to bring out the best properties of the rubber. With this type of formulation it is possible, by adjustment of the acceleration, to obtain a cure or even an overcure in five minutes.

A lignin compound containing litharge, curing in 20 minutes at 282° F., had a tensile strength about 800 psi. above that obtainable with MPC carbon black. The Bashore resilience figure for the lignin compound was about double that for MPC carbon black. This comparison was made with equal volume loadings (27.7 vols.) of the two reinforcing agents. Almost equally good results were obtained with copper and bismuth oxides.

The aging qualities of vulcanizates containing lead oxide and lignin appear to be good, and even copper oxide, normally considered detrimental, ages satisfactorily provided an antioxidant is included. A lignin compound containing seven parts of copper oxide on 100 parts of rubber and two parts of antioxidant showed a drop of less than 20% in tensile strength after two days in an air oven at 90° C.

FRIDAY MORNING—MAY 2

9:00 a.m.—**19. A Study of the Oxidation of Rubber by Means of the Isotopic Method. A. D. Kirshenbaum** and A. G. Streng, Temple University, Philadelphia, Pa., and A. H. Nellen, Lee Rubber & Tire Corp., Conshohocken, Pa.

To determine the state of oxidation when studying the oxidation of rubber by mastication, oxygen, or ozone, one has to know the physical properties and the oxygen content of the rubber at the various stages of oxidation. In the past the oxygen was determined by one of three ways: (a) by difference; (b) by the ter Meulen Method, and (c) by the Schütze-Unterzaucher method. None of these methods will give accurate, reliable results, since accumulative errors are obtained when determining the oxygen content by difference and low results when determining oxygen by either the ter Meulen or Schütze-Unterzaucher methods. The low results for both of these methods are due to the fact that both methods require complete vaporization of the samples; while rubber does not vaporize, but instead leaves an oxygen-containing carbonaceous residue. Therefore a good, reliable method for determining the oxygen content of rubber was needed.

In these studies the isotopic method developed five years ago to determine the oxygen content of organic compounds was perfected so that it can be used to determine, rapidly and accurately, the percentage of oxygen in rubber. The isotopic method has the fundamental advantage that quantitative results are obtained without any quantitative separation or recovery of any oxygen or oxygen-containing compounds and can be used with both volatile compounds and compounds forming carbonaceous residues containing oxygen.

The oxygen content of rubbers passed through the plasticator, exposed to ozone, oxidized in the Geer oven and oxidized in the O_2 bomb was analyzed by this method. The oxygen values obtained agreed very nicely with the "gain in weight" values upon oxidation.

The oxidation of rubber in the O_2 bomb at 70° C. was studied by means of the isotopic method of analysis. The results obtained showed a gradual increase in the oxygen content of the rubber during the first 30 hours of oxidation, indicating the oxidation of double-bonds and oxidizable chain terminals. After 30 hours all the double-bonds were oxidized since the oxygen content of the rubber did not increase upon oxidizing for an additional 100 hours. Upon further oxidation, after 130 hours, the oxygen content of the rubber started increasing again, indicating a splitting and subsequent oxidation of the rubber molecule.

9:30 a.m.—**20. Effect of Oxygen Concentration on the Aging of Rubber Vulcanizates. I. The Effect of Partial Pressure of Oxygen on the Rate of Oxygen Absorption.** J. Reid Shelton and **Wm. L. Cox,** Case Institute of Technology, Cleveland, O.

The effect of oxygen concentration upon the rate of oxidation of rubber has been reported previously as negligible in some cases and appreciable in others. The present study was undertaken to clarify the situation relative to the effect of the partial pressure of oxygen (in combination with nitrogen) upon the rate of oxygen absorption.

The results show that the rate, in the constant-rate stage, varies as the square root of the oxygen pressure in the case of amine-inhibited stocks of natural rubber and GR-S. An equation of the form, $K_2=k(P+a)^{0.5}$, fits the experimental data, and an equation of similar form has been derived from an appropriate free-radical chain mechanism.

The dependence of rate on oxygen concentration indicates that initiation by direct oxygen attack on the hydrocarbon is an important step in the oxidation mechanism in the case of amine-inhibited stocks in the constant-rate stage (controlled by the antioxidant).

The fact that the rate is a function of the square root of the oxygen pressure (rather than the first power) suggests that antioxidants of the amine type do not function by a chain-stopping mechanism. Their function may involve promotion of peroxide decomposition to stable products rather than to chain-initiating free radicals.

9:55 a.m.—**21. II. The Effect of the Partial Pressure of Oxygen on the Changes in Physical Properties Accompanying Oxidation. J. Reid Shelton** and Wm. L. Cox.

This study was undertaken to determine the effect of oxygen concentration on the nature of the aging obtained with rubber vulcanizates.

An increase in the partial pressure of oxygen in the aging atmosphere increases the rate of oxygen absorption and the resultant overall deterioration of physical properties. The nature of the aging is also altered in that chain scission is favored, resulting in a softer stock with lower modulus. The cross-linking reaction is favored at lower oxygen concentrations, as evidenced by a greater stiffening of the stock for a given amount of oxygen absorbed. This trend extends to heat aging in the absence of oxygen as shown by the marked stiffening of GR-S on heating in lamp-grade nitrogen.

These data suggest that $R^{\bullet}$ radicals add to double-bonds more readily than $RO_2^{\bullet}$ radicals, and that such an addition of free radicals to double-bonds is probably one mechanism of cross-linking. Data of the type presented here on the effect of oxygen concentration and of temperature on the nature of the deterioration resulting from a given absorption of oxygen point the way to more reliable interpretations of the information obtained with accelerated tests.

10:20 a.m.—**22. Products of Oxidation**

of an Olefin Structurally Related to GR-S. G. R. Mitchell, Olin Industries New Haven, Conn., and J. Reid Shelton.

The important role which oxidation plays in the deterioration of rubber and related materials prompted this investigation. The formation of hydroperoxide as a primary product of a free-radical chain reaction mechanism has been demonstrated in the prior literature. The object of this study was to learn more about the products of the secondary oxidation reactions which are so important in determining the properties of these materials in service and their resistance to aging.

An olefin structurally related to GR-S —5-phenyl-2-pentene—was oxidized with molecular oxygen at 80 and 100° C. Quantitative measurements were made at various stages of oxidation for oxygen absorbed, unreacted olefin remaining, carbon dioxide and water liberated, hydroperoxide, carbonyl, ester, epoxide, and acid formed.

The data suggest that hydroperoxide is dehydrated to ketone, which in turn is oxidized by peracid or peroxide to ester. The free acids obtained indicate that chain scission occurs both by oxidative scission at the double-bond and by splitting of oxy radicals formed from peroxide decomposition. Since most of the oxygen asorbed was accounted for in oxygenated products, the observed decrease in unsaturation apparently results from cross-linking by addition of carbon radicals to double-bonds to initiate polymerization by a free-radical mechanism. Similar reactions probably occur in the oxidative aging of GR-S and related materials.

•10:45 a.m.—**23. A Water Bomb for Studying the Oxidation of Elastomers. H. H. Gillman** and **Wm. H. Hines, Jr.,** Gates Rubber Co., Denver, Colo.

A method is proposed which allows extension of present frontiers on the subject of oxidation and aging and also permits new measurements to be made which have heretofore not been available. These newer measurements and extension of boundaries allow greater insight into the overall fundamental problem of reactivity of unsaturated elastomers with oxygen.

The water bomb method submerges rubber samples in water in a heated autoclave. The temperatures of oxidation study are limited only by the characteristics of the vessel. Oxidizing agents, or various modifying materials, are injected at desired intervals. Samples of liquid are withdrawn by use of a sampling tube and titrated for residual oxidizing power. Any other solution properties can, of course, be also measured.

Data are presented on the oxidation of natural rubber and GR-S expressed in fundamental units; the temperature coefficient is calculated; the effect of pH on reactivity is plotted; the role of rubber poisons, such as manganese in accelerating oxidation, is also shown.

If desired, cured plates can simultaneously be immersed into the water bomb for standard stress-strain measurements. Under specified oxygen concentration and temperature conditions, a period of three hours in the water bomb is equivalent to 192 hours in the Bierer-Davis oxygen bomb.

Compounding ingredients can be studied both individually and in rubber stock. Carbon black can be altered, and the progress of reaction followed by Orsat analysis of the gaseous phase.

11:10 a.m.—**24. Photomicrography of Progressive Ozone Cracking in Rubber Stocks. W. G. Mayes** and Marie L. Barzan, Firestone Tire & Rubber Co., Akron.

A method of studying ozone cracking of rubber stocks is described; the method consists of taking a series of photomicrographs of the progressive formation and growth of ozone cracks. From this series of photomicrographs a mathematical relation can be drawn between crack dimensions and time. The time required for the first crack to form and the number of cracks formed vary with the amount of elongation; the greater the elongation, the shorter the time to first crack, and the greater the number of cracks. In a white sidewall stock held at 15% static elongation, all the ozone cracks were formed within the first 20 hours of exposure to atmosphere containing 2.5 parts per 100,000,000 of ozone; the majority of the cracks were formed between the eighth and ninth hours. The maximum rate of crack length increase occurs between the fourth and fifth hours of elongation. An illustration is given showing that a rating of ozone resistance based on the time for the first crack to appear may be quite different from a rating based on crack dimensions or appearance.

11:35 a.m.—**25. An Apparatus for the Evaluation of Ozone Protective Agents for Elastomers under Dynamic Conditions. K. E. Creed, Jr.,** R. B. Hill, J. W. Breed, Monsanto Chemical Co., Nitro, W. Va.

The widespread acceptance of synthetic elastomers for use in rubber products has greatly magnified the problem of obtaining satisfactory protection against weathering in general and ozone attack in particular. In an effort to find chemical additives which would afford the necessary protection, it was found that the tentative ASTM method of evaluation was not entirely satisfactory for this purpose.

This paper descries a dynamic apparatus for the accelerated testing of ozone protective agents which has been found to give consistent results that appear to correlate well with outdoor tests. A brief background is given on the development of the test specimen and equipment. The apparatus consists of rotating pulleys mounted within a circular chamber. The test specimens, consisting of molded belts measuring ½-inch wide, ⅛-inch thick, and 5⅞ inches in diameter and running around two pulleys, are flexed at a rate of approximately 75 flexes a minute; the rotation provides a mometary elongation through a range of 0-20% while passing over the pulleys. Air having an ozone concentration of 25 ±5 parts per 100,000,000 is circulated at a desired temperature, usually 30° C., and uniformity is insured by the use of a fan in the chamber. The concentration of ozone is determined by the conventional potassium iodide method.

This apparatus was adapted because (1) it produced uniform results; (2) the flexing provided a mobile surface so that rigid waxy films could not be formed; (3) molded specimens eliminate the possibility of freak cracking and anomalies due to minute nicks or imperfections which might occur during the dieing out of conventional specimens; and (4) it facilitated the interpretation of results since a larger surface was availale for examination.

The exposed rings are visually compared at intervals with a series of standards, and an arbitrary value indicative of the extent of cracking at each interval is assigned to each ring. For comparative purposes, these values are interpreted mathematically, and a relative final rating is assigned to each ring. Test results in typical *Hevea* and GR-S tread stocks are given.

Rubber Developments by Agriculture Department

THE production in the United States of natural rubber from the guayule shrub as good as imported rubber was revealed by P. A. Wells; director of the eastern regional research laboratory, United States Department of Agriculture, in a talk before the seventeenth annual meeting of the National Farm Chemurgic Council in St. Louis, Mo., on March 11.

"We can now produce natural rubber of a quality capable of meeting any critical need that may arise," Dr. Wells said.

A 9-20 heavy-duty guayule rubber truck tire that had been run more than 50,000 miles at a speed of 40 miles an hour was on display during the meeting.

Prospects for a dependable Western Hemisphere natural rubber output continue to improve with the development of new cultural techniques and new high-yielding trees resistant to disease by scientists of the Department of Agriculture, the Latin American countries, and industry. This work is being carried out as part of the Point Four program of technical cooperation administered by the State Department's Technical Cooperation Administration. The most recent development in this program was a demonstration in Costa Rica that the "three-component" *Hevea* rubber tree can now be transplanted with more than 85% success even in dry weather. This tree consists of a top highly resistant to South American leaf blight budded to a high-yield middle part or "panel" that, in turn, is a budgraft on a rootstock selected for rapid growth. Formerly more than half of these plants were lost during transplanting, even in the most favorable season.

The two important factors in successful survival of trees following transplanting were found to be adequate rainfall and wrapping of the tree trunks with a special kraft paper made for this purpose. As a result of the advances already made, rubber plantations in the 11 cooperating Latin American countries have been expanded to include some 35,000 acres of the three-part trees, about half the trees now in production.

High Polymer Course

A SPECIAL program in the colloid chemistry of Elastic High Polymers in Science and Industry will be held at Massachusetts Institute of Technology from June 16 to July 15. According to E. H. Huntress, director of the MIT summer session, the course is planned to present the latest information on the chemical composition, structure, and production of elastic high molecular colloids, both inorganic and organic, to persons actively engaged in the production and application of natural and synthetic elastomers.

The course will be conducted by Ernst A. Hauser, professor of chemical engineering of the Institute, who will place special emphasis on concepts of new developments in the field and possible improvements in properties of elastomers. All facilities of the Institute will be open to members of the course, and living accommodations will be available. Requests for application forms and further information should be addressed to Dr. E. H. Huntress, Director of the Summer Session, Room 3-107, Massachusetts Institute of Technology, Cambridge 39, Mass.

ASTM Committee D-11 Cleveland Spring Meeting

COMMITTEE D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials met at the Hotel Statler, Cleveland, O., March 7. The meeting of the full committee was preceded by meetings of many of D-11 subcommittees on March 5, 6, and 7. In addition there were meetings of the D-11 advisory committee on the evening of March 6 and of the committee for the symposium program on natural rubber to be given in connection with the fiftieth anniversary meeting of the parent Society to be held in New York, N. Y., during the week of June 23.

D-11 Meeting

The meeting of D-11 the afternoon of March 7 was conducted by Simon Collier, Johns-Manvillle Corp., chairman, with the assistance of Arthur W. Carpenter, B. F. Goodrich Co., secretary.

Mr. Collier pointed out that 1952, in addition to being the fiftieth anniversary of founding of ASTM, was also the fortieth anniversary of the founding of Committee D-11.

It was announced that the committee in charge of the symposium program for the June meeting in New York would be headed by Norman Bekkedahl, National Bureau of Standards, chairman of subcommittee 12 on crude natural rubber. Other members of the committee are J. J. Allen, Firestone Tire & Rubber Co.; L. M. Baker, General Tire & Rubber Co.; A. E. Juve, B. F. Goodrich Research Center; W. N. Keen, E. I. du Pont de Nemours & Co., Inc.; David Scott, Jr., Scott Testers, Inc.; R. G. Seaman, India RUBBER WORLD; R. F. Tener, NBS; with Mr. Collier and Paul Smith, of the ASTM staff, as ex-officio members.

Dr. Bekkedahl stated that the title of the symposium has tentatively been decided upon as "Recent Developments in the Evaluation of Natural Rubber." Papers on the following subjects will probably be included in the program: (1) Technical Classification of Crude Natural Rubber. (2) Determination of Rate of Cure by Means of the Mooney Viscometer. (3) Vulcanization Characteristics as Determined by the Strain Tester. (4) Use of Viscosity Measurements in Evaluating Rubber. (5) The Quantitative Determination of Dirt in Rubber. (6) Preparation of Standard Natural Rubber. (7) The Use of the Instron Machine in Testing Rubber. (8) New Apparatus for Ozone Aging of Rubber.

The symposium will probably be presented in a single, 3½-hour session on the afternoon of Thursday, June 26.

Titles, abstracts, and the names of the authors of the papers must be in the hands of the symposium committee not later than April 14, and the complete paper should be available by June 1. The committee plans to meet April 17 in Philadelphia, Pa., at ASTM headquarters for the purpose of evaluating the abstracts of the papers to be presented and finalizing the symposium program.

It was announced that F. M. Galloway, Quaker Rubber Co., has been appointed chairman of subcommittee 2 on belting.

R. D. Stiehler, NBS, reported on the fourth meeting of Technical Committee 45 on Rubber of the International Standardization Organization, held in Oxford, England, October 1-5, 1951. Dr. Stiehler was the leader of the United States delegation. Other members were R. S. Havenhill, St. Joseph Lead Co.; Ethel Levene, United States Navy Department, Bureau of Ships; and H. C. O'Brien, Royston Laboratories.

The use of ASTM standard methods on a worldwide scale was evident from the ISO meeting, and consideration should be given, therefore, to international use in preparing such standards, particularly with reference to the units of measurement specified. Wherever possible, metric units should be used, Dr. Stiehler said. The British Standards Institution has adopted the policy of using metric units in all new standards, and similar action in the United States would be desirable.

Draft proposals were approved for submission to member countries for the ratification of the following ISO Standards: (1) Tension Stress-Strain Testing; (2) Tear Strength Testing; (3) Hardness Testing; (4) Rubber-to-Fabric Adhesion; (5) Abrasion Testing with the du Pont Abrader.

In addition, substantial progess was made toward draft proposals for ISO Standards on testing for rubber-to-metal adhesion, and for mechanical stability of *Hevea* latex. Other subjects that were discussed, but were referred for further study before draft proposals are prepared include: low temperature resistance; flex cracking; aging; dynamic modulus and resilience; mechanical conditioning; latex; and classification of crude natural rubber.

A detailed report of the meeting has been distributed to all the subcommittee chairmen of Committee D-11.

The next meeting of the ISO will be held in Paris, France, in the Spring of 1953.

Subcommittee Meetings

Subcommittee 5—Insulated Wire and Cable. J. T. Blake, Simplex Wire & Cable Co., chairman. Considerable time was spent on a discussion of a reorganization and enlargement of the specifications for wire and cable. It is proposed that when this reorganization is completed, there will be a new master specification covering the constructional details of wires and cables for power usage. All testing and sampling procedures will be in a single enlarged version of Method D470. The other specifications will be concerned only with the physical and electrical properties of the individual types of compounds.

It is believed that when these revisions are completed, it will be possible to purchase a complete product by means of ASTM specifications, and this arrangement will fill a real need commercially.

The method for determining the temperature coefficient for insulation resistance is now ready for letter ballot in the subcommittee.

Subcommittee 6—Packings. F. C. Thorn, Garlock Packing Co., chairman. J. D. Cole, Cole Electric Co., exhibited the new version of the Relaxometer, designed and built by him at the suggestion of R. G. Farnum, F. D. Farnum Co., for the study of relaxation characteristics of non-metallic gasket materials.[1] This instrument will be one of the several used in a testing program by the subcommittee.

At the request of Section 10 of SAE-ASTM Technical Committee A, editorial changes were made in Method D1417-51T to relieve the SAE-ASTM and others using this method of the necessity of including preloads and major loads in other specifications.

After a discussion of the advisability of substituting the thickness of compressed asbestos sheet, as measured under preload, for the present thickness, as defined in Method D733-51T as that obtained by a dial age under a nine ounce weight, it was decided to leave the specification as worded at present. But the addition of the following phrase to the last sentence of paragraph 5 of D733, "and in no case less than ¼ of an inch from the cut edge," was recommended.

A section was set up to consider the advisability of revising paragraph 7 of D733, (Bending Test).

Subcommittee 6 requests Committee D-11 have Section 10 of SAE-ASTM Technical Committee consider the inclusion in Method D1170 of gasket types primarily intended for industrial rather than automotive use. It is felt that it would be more desirable to have the specifications for both types of gaskets in D1170 instead of to have Subcommittee 6 develop a new specification for industrial gaskets. Subcommittee 6 recommends at this time the inclusion of a specification applicable to a high sulfur, GR-S type of sheet very widely used in oil refinery service, in contact with oils at temperatures up to 500° F. It was requested that members of subcommittee 6 who are also represented on Section 10 of Technical Committee A be prepared to supply data for such a specification.

Subcommittee 9—Insulating Tape. R. H. Titley, Public Service Electric & Gas Co. of N. J., chairman. Subcommittee 9 recommends to Committee D-11 that the Emergency Alternate Provisions be removed from D119-48T and D69-48T. The provisions of the Emergency Alternate Specification of D69-48T with respect to pinholes are recommended for inclusion in D69-48T in place of the existing requirements in the connection. A letter ballot of D-11 of these matters is recommended.

A new tentative specification of ozone resistant tape is to be revised by the chairman of Subcommittee 9 in accordance with suggestions of the subcommittee and then submitted for letter ballot in the subcommittee.

The sampling procedure submitted by B. J. Barmach, Commonwealth Edison Co., was discussed, and it was decided that more information was desirable, and that consumers are to be requested to submit data on the results of their inspections similar to the tabulations presented by the chairman of Subcommittee 9.

Subcommittee 10—Physical Testing of Rubber Products. L. V. Cooper, Firestone, chairman. Some discussion was held of the work of the section on methods of determining mill roll temperatures.

The latest revision of Method D15A, D15B, and D15C was discussed at length, and after making several editorial changes the subcommittee voted to submit the latest revision of D15 to letter ballot in Committee D-11.

Subcommittee 12—Crude Natural Rubber. Norman Bekkedahl, chairman. A report on the "Characterization of Technically Classified Rubber" was given by A. G. Veith, of Goodrich. It was shown that the non-rubber hydrocarbon content of natural rubber plays a major role in determining the vulcanization and processing behavior. Increased quantities of these

[1] See India RUBBER WORLD, Mar. 1951, p. 679.

serum or non-rubber materials promote a faster rate of cure and a lower breakdown. Methods for measuring these rates of breakdown and cure were described, and a proposal for a processability index was given. These data and other data obtained by L. V. Cooper and reported at the June, 1951, Atlantic City meeting, indicated that in general the grades of technically classified rubber were placed in their proper order, but that there was frequent overlapping.

R. H. Taylor, U. S. Department of Agriculture, described results obtained from a worldwide program of Mooney viscosity testing on natural rubber conducted by the International Rubber Research Board. Good agreement has not yet been established between results obtained in the various laboratories. Work is being continued in an effort to improve the agreement among the laboratories in the United States.

M. C. Bartlett, Goodrich, reported on the results of a round-robin test for the quantitative determination of dirt in rubber. Two good procedures, the "solution method" and the "hot oil method" for dirt in rubber, now have been developed by the subcommittee.

A. E. Juve and R. D. Stiehler reported on the results of chemical and physical tests made on three lots of crude natural rubber made by United States Rubber Co. and proposed as a possible source of standard samples. These lots were obtained from a single lot of bulked latex which had been preserved with formaldehyde and represented once-creamed latex without stabilizer and once-creamed and twice-creamed latex with stabilizer added. It appears that a fairly uniform lot of rubber may be obtained for use as a standard sample. It was suggested that if and when standard samples of natural rubber were available, they should be possible of distribution on an international basis.

Subcommittee 15—Life Tests for Rubber Products. G. C. Maasen, R. T. Vanderbilt, Co., chairman. R. C. Boyd, Bakelite Corp., reported further on the progress in Committee D-20 on Plastics in the development of an oven and a method for the determination of volatile loss from plastics on heating to elevated temperatures. The new oven for this work, being built by Precision Scientific Co., is expected to be available by June. Mr. Maassen suggested the desirability of other aging tests for plastics, particularly on heat stability. A. W. Carpenter will write Committee D-20 on this matter of additional aging tests, particularly for non-rigid vinyl plastics.

Dr. Stiehler reported that the letter ballot in Committee D-11 on the "Tentative Method of Test for Resistance to Aging of Vulcanized Rubber by Measurement of Creep" was favorable, and that the method will now be adopted as a tentative standard.

A report of progress on miscellaneous properties and their effect on life aging by G. R. Reinsmith, U. S. Army Ordnance, was read. Rubber aging tests have indicated that: (1) With the absorption of a given amount of oxygen in natural rubber, the loss in tensile and elongation is independent of sulfur and accelerator concentration. (2) The rate of oxygen absorption at room temperature can be determined from data on short-term tests at high temperatures. (3) Aging at different temperatures changes the rate of cross-linking to scission of polymer chains; therefore oven aging tests should be performed at a minimum of two different temperatures. (4) Oxygen absorption studies indicate that pure oxygen yields greater chain scission than aging in air. (5) Static elongations of natural rubber produces deeper • ozone cracking than dynamic flexing at all temperatures. (6) A tentative specification has been prepared for volumetric oxygen absorption of rubber. When limits are established, this specification will aid in differentiating between rubbers with good or poor aging properties on the premise that rubbers absorbing oxygen beyond a certain limit will age poorly.

Also, in studying the best means of protecting GR-S from ozone, antioxidants of the type of Tenamine II will be synthesized to determine their structure and how it contributes to ozone resistance. Degradation products resulting from the action of ozone on GR-S will be determined as a means for determining measures to be employed in retarding or preventing ozone deterioration in rubber.

It has been found that a mixture of 75% paraffin and 25% microcrystalline wax yields the most protection to GR-S exposed to ozone. Other preliminary tests indicate that in tires natural rubber is more resistant to ozone than standard GR-S; while "cold" GR-S has the least resistance.

The Firestone weathering apparatus, developed by Firestone in conjunction with the Ordnance Department,[2] will be constructed for use at Rock Island Arsenal as soon as materials are available.

The study of aged Ordnance tires, returned from overseas storage, revealed cracking that penetrated to the tire fabirc, and the same condition prevailed on examination of tires returned from various Ordnance depots. It is considered that cracks of this nature can produce ply separation with subsequent sidewall failure. On-the-road service testing has been recommended for predicting the remaining available service life of these aged tires. The Ordnance Department has entered into a contract with the NBS to develop an improved indoor laboratory tester for tires, which is expected to be completed by 1954.

G. N. Vacca, Bell Telephone Laboratories, reported that proposed revisions of aging specifications to D454, D572, D573, and D865 to conform to D412 have been approved by a letter ballot in the subcommittee and are recommended for letter ballot in Committee D-11.

Letter ballot in subcommittee to change status of D749 on method of calibrating light source, from tentative to standard was voted in the affirmative. However, since it is apparent that the method is not used very much, it was decided to appoint a task force, comprised of J. E. Norton, Atlas Electric Devices, and R. F. Tener, to study the project. No recommendation was made to Committee D-11.

Similar action was taken with regard to D750, the method for the resistance to accelerated light aging. No recommendation was made to Committee D-11.

Subcommittee 17—Tests of Hardness, Set and Creep. Sherman R. Doner, Raybestos-Manhattan, Inc., chairman. The subcommittee recommended that Method D314-39 on hardness testing be reverted to tentative, in order that it may be revised to include the latest instructions for care of the instrument used and a schematic line drawing inserted to show more clearly certain details which must be observed to insure reproduceable readings. It was also recommended that reference to the instrument as a "reference standard" in paragraph 4a of D314 be deleted because of the fact that readings of this instrument cannot be converted to those of other hardness testing instruments, particularly when used on synthetic rubber compounds.

The section on instruments is continuing its work with the P & J plastometer and the Wallace hardness meter and will have a report at the next meeting.

Subcommittee 17 requests that the proposed "Tentative Method of Test for Low-Temperature Compression Set of Vulcanized Elastomers" be submitted to Committee D-11 for letter ballot.

The section on stress relaxation testing reported progress and is setting up an additional series of tests.

The subcommittee recommended that its chairman write the American Standards Association indicating interest in the "ISO-TC-45 Proposed Method for the Determination of Hardness." It is possible that technologists in the United States may wish to adopt the ISO proposal in the future because the instruments suggested may be better than those in use in the United States, and the hardness scale on the proposed instruments closely follows the Shore A instrument scale.

Subcommittee 19 —Tests for Properties of Rubber and Rubber-Like Materials in Liquids. W. N. Keen, chairman. Subcommittee 19 recommended the following actions in connection with Method D471-51T for letter ballot in Committee D-11.

1. To replace ASTM Reference Fuels Nos. 1 and 2 with Types I and II Standard Test Fluids from Military Specification MIL-H-3136, and to identify these test fluids with the letters A and B in D471.

2. To recognize the testing of rubber specimens cut from a finished article of commerce.

3. To recognize the use of the Jolly spring balance in volume increase work.

4. To approve other minor changes too numerous to mention in this report, but detailed in the formal recommendation.

The minutes of the joint meeting of Subcommittee 19 and subsection IV-H of SAE-ASTM Technical Committee A, held in Washington, D. C., February 1, were read and approved.

Subcommittee 20—Adhesion Tests. L. E. Cheyney, Minnesota Mining & Mfg. Co., chairman. The subcommittee discussed various actions and recommendations of ISO—Technical Committee 45—Rubber. The following action was taken by Subcommittee 20:

1. On rubber to-fabric adhesion, the section on the effect of humidity and temperature on synthetic textiles found six laboratories in the United States with a limited amount of information on this subject. A summary report will be submitted to the ISO committee. A recommendation for a round-robin testing program to augument the existing information was tabled for future reference.

2. ISO Document 147 (Proposed Rubber Fabric Adhesion Testing Method) was discussed and Subcommittee 20 recommends the inclusion of speed of jaw separation and objects to the wide range of permissible speeds proposed.

3. In connection with ISO Document 113 (Proposed Rubber/Metal Adhesion Testing Method) and ISO Document 122 (British proposal for use of a smaller button test specimen), H. H. Irvin, Marbon Corp., was delegated to present the objections of Subcommittee 20 to these proposals.

4. A progress report on the work being done in connection with ASTM Method D429 was presented.

[2] *Ibid.*, Sept., 1951, p. 696; Oct., 1951, p. 55.

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5. Mr. Larsen, of Lord Mfg. Co., discussed the method used in Lord laboratories for measuring rubber-to-metal adhesion with a Scott tester. It was decided to publicize the method in order that more work could be done with it.

6. Mr. Mathues, Inland Mfg. Division, General Motors Corp., discussed the experience of that company with the Buist-Naunton impact adhesion test. He suggested that some changes in the equipment are necessary and said that the significance of the test is not yet clear. Additional work by other organizations on this test is encouraged, and the subject will be reopened at a later date.

Subcommittee 21—Testing of Rubber Cements and Related Products. J. F. Anderson, Goodrich, chairman. Subcommittee 21 recommended editorial changes in the new "Tentative Methods of Test for Adhesives and Brake Lining and Other Friction Materials," which has just been approved by letter ballot in Committee D-11. A discussion on the development of additional methods of test followed, and plans were made for a meeting of Subcommittee 21 in connection with the ASTM annual meeting in June.

Subcommittee 23—Hard Rubber. C. P. Morgan, Vulcanized Rubber & Plastics Co., chairman. The section on asphalt containers discussed impact testing, and the chairman of the section will write a proposed method for possible inclusion in Method D639, if agreement can be reached at the June meeting.

The section on hard rubber studied results of tensile and elongation tests at various temperatures and humidities, and further amplification of this phase of hard rubber testing was considered desirable.

Results on an evaluation of hardness testing instruments were presented in an attempt to find equipment that would cover the entire range in cross-sections, which is now limited by the apparatus presently in use, and to develop a method suitable for this purpose. Work on this project is being continued.

The subcommittee voted to revise or add a supplementary footnote to the method covering test specimen preparation for tensile and elongation tests.

Subcommittee 24—Tests for Coated Fabrics. S. H. Tinsley, Vanderbilt, chairman. The section chairman on scrub testing has resigned from the subcommittee because he has been transferred to another division of his company and to work not related to coated fabrics.

The section chairman on adhesion testing presented a summary report on the proposed method of testing thin films, particularly vinyl films, which has been under consideration for inclusion in Method D751-46T. Results of a questionnaire sent to the subcommittee on adhesion testing were also reported. Additional problems relating to width of test specimens, the necessity of longitudinal and transverse direction testing for adhesion, and the distance of pull-down, not presently mentioned in the tentative test method, were discussed. A copy of the report will be distributed to members of Subcommittee 24.

A number of possible new test methods for coated fabrics, including those relating to low temperature properties, plasticizer loss, flammability, resistance to grease and oils, dry cleaning fluids, air and vapor permeability, etc., were presented for consideration, and a number of these will be investigated for possible inclusion in the methods for testing coated fabrics.

L. E. Cheyney submitted ISO-TC-45 Document 121, a proposed method for rubber-to-fabric adhesion, for consideration of Subcommittee 24. It was referred to the chairman of the section on adhesion testing.

Subcommittee 25—Low-Temperature Tests for Rubber and Rubber-Like Materials. R. S. Havenhill, chairman. As a result of the last meeting of ISO-TC-45, a section headed by C. K. Chatten, Brooklyn Navy Yard, and including J. F. Kerscher, Goodyear Tire & Rubber Co., and F. S. Conant, Firestone, was appointed to study methods for the low-temperature testing of elastomers as employed by ASTM and the British and make critical comments and recommendations to Subcommittee 25.

The subcommittee recommends that the standardization method for the wire used in the Gehman torsional stiffness test be submitted for letter ballot in Committee D-11 for inclusion in Method D1053-49T. B. G. Labbe, Government Evaluation Laboratory, who developed this method, will also report at the next meeting of the subcommittee on the means of calculating modulus from the torsional stiffness results obtained with the Gehman apparatus.

Although a recent letter ballot of Committee D-11 approved the reinstatement of Method D736 for low-temperature properties of rubber, it was recommended that with the reinstatement of this method as an ASTM standard, the scope should be revised to point inherent inaccuracy in this method and to suggest that the more precise Method D746 be used instead. It was also recommended that all existing specifications calling for the use of Method D736 be changed over as rapidly as possible to specify the use of Method D746. The trend in procurement for the Armed Services is to specify D746 instead of D736.

R. C. Boyd reported that the matter of hinge breaks had been taken care of in the latest revision of D746, now before the ASTM administrative committee on standards for approval.

Subcommittee 26 — Processability Tests. R. H. Taylor, chairman. A negative vote in the recent letter ballot in Committee D-11 on the revision of Method D927-49T on Mooney viscosity determinations resulted in the recommendation to D-11 that the following editorial change in this method be made: Change the wording of section 7, item 9, of the method as submitted for letter ballot to read "50 ML, 1 + 4 mins. (212° F.)" instead of "50 ML, 212° F., at 1-5 mins." Also, "1 and 4 is the time of reading," after starting the motor of the Mooney viscometer, instead of "and 5 is the time of reading."

A discussion of serrated *versus* smooth rotors for the Mooney viscometer revealed that the smooth rotor was considered an adequate replacement for the serrated rotor except for the testing of extremely high viscosity rubbers. It also developed that the nature of the surface of the metal of the Mooney rotor and die holder has an effect of viscosity readings.

In connection with this matter of smooth *vs.* serrated rotors, M. Mooney, U. S. Rubber, reported on work he has been doing on the measurement of slippage of rubber on smooth, hot metal surfaces. Measurements in connection with the extrusion of rubber indicate that some slippage of rubber on hot metal surfaces was a function of shearing stress if the rotor in the viscometer was lubricated with soap. The amount of slippage was not considered significant with rubbers of the usual range of viscosity, and no work had been done on high viscosity rubbers.

Subcommittee 27—Tests of Resiliance. E. G. Kimmich, Goodyear, chairman. The effect of creep on Yerzley oscillograph resilience values was discussed, and correspondence with Dr. Yerzley on the matter distributed, but no conclusion was reached.

A section was appointed to investigate the question of possible changes required in the method for pendulum rebound determinations when testing rubber having a hardness greater than 70 on the Shore A instrument.

A. E. Juve and G. W. Painter, Lord Mfg., were appointed for liaison work between Subcommittee 27 and Committee D-20 in connection with the investigations of methods of testing rubber ad rubber-like materials being carried out by Committees D-11 on Rubber and D-20 on Plastics.

Subcommittee 28—Statistical Quality Control. J. D. Heide, U. S. Rubber, chairman. An organizational meeting of this committee was held. R. D. Stiehler was appointed vice chairman.

It was decided that the first business of this new subcommittee was as follows: (1) To sponsor pertinent papers on the subject of statistical quality control at future ASTM meetings. (2) To ask the other D-11 subcommittee chairmen to assign a qualified member of their subcommittees to attend the meetings of subcommittee 28. (3) To check the applicability to work in Committee D-11 of a write-up prepared by Committee D-13 on Textiles on the use of statistical quality control methods in testing. (4) To examine and offer recommendations on the proposed use of the median in reporting tensile test results in Method D412 on tension testing. (5) To work with Subcommittee 12 on determining the proper methods of sampling of crude natural rubber.

Subcommittee on Standard Samples. A. E. Juve, chairman. Work has continued on the problem of developing a source of standard natural rubber. The rubber, prepared by U. S. Rubber under the direction of E. M. McColm, has, since the last report of this subcommittee, been examined by the National Bureau of Standards.

Tests at the Bureau indicate good within-bale and between-bale uniformity for all three lots submitted. Mooney viscosities are all within 71-76 ML, 4 min. at 211° F. The curing rate decreases from the first lot (the fastest) to the third (the slowest). Based on the technical classification scheme proposed by the natural rubber producers, te first lot would be classified as Yellow O, the second as Yellow—, and the third as Red—.

For ASTM purposes it would seem that either the first or the second lot represents the most desirable material for standard samples, inasmuch as the cure rate corresponds to the central, Yellow, classification.

A further investigation of the possibilities of this type of rubber as a standard will be undertaken.

Holds Annual Dance

THE Quebec Rubber & Plastics Group held its annual dance February 29 at Victoria Hall, Westmount, P.Q., Canada. Some 260 members and guests enjoyed a very entertaining evening. Refreshments were served, and there was a drawing for many valuable door prizes contributed by local rubber and supplier companies.

Yohe on Liquid Systems

THE Los Angeles Rubber Group, Inc., held a regular meeting on March 4 at the Mayfair Hotel, Los Angeles, Calif. Some 70 members and guests attended the afternoon technical session which featured a talk on "Liquid Systems—The Shape of Things to Come" by R. V. Yohe, American Anode, Inc; while 215 were present at the evening dinner session.

Dr. Yohe stated that liquid plastics have been developed during the past few years which are replacing rubber latex in certain products and are being used in other products not possible with latex. The latex industry, therefore, is faced with a competitive newcomer which threatens to a degree the future of the industry. Recent high prices for natural rubber latex and the inadequacy of synthetic latices fully to replace natural latex in all applications have handicapped the development of new uses for the various rubber latices. The latex industry needs a stabilized price for natural latex at a suitably low level, research aimed at the development of an all-purpose synthetic latex to replace natural latex, and the development of new methods for using latex systems to provide new applications, the speaker declared.

Liquid plastics, such as the plastisols, plastigels, and organosols, are rapidly finding many new uses, Dr. Yohe continued. Not only are these materials replacing rubber latices for dipping, coating, and casting, but they are also replacing milled plastics in certain molding and calendering applications. It is estimated that within a few years these liquid plastics may account for as much as 25% of the overall plastics manufacturing business in this country. The use of liquid materials for these manufacturing methods requires lighter and cheaper equipment and involves fewer mechanical hazards than the processes normally used in the rubber and plastics industries. It may be concluded, therefore, that the field for liquid systems has great potentialities for the future.

Instead of the usual speaker, the dinner session included a program of entertainment, with contributions made by members R. R. Reese, American Anode; E. C. McLaughlin, H. M. Royal, Inc.; and M. A. MacDonald, Pacific Hard Rubber Co. Prizes distributed by a committee headed by A. H. Federico, C. P. Hall Co. of California, were won by H. A. Hall, Kirkhill Rubber Co.; Mike Rochowicz and Dallas Heatherly, both United States Rubber Co.; Mr. McLaughlin; R. L. Bowen, Xylos Rubber Co.; P. U. Faber, United Rubber Corp.; B. E. Biheller, H. Muehlstein & Co., Inc.; and R. B. Stringfield, Fullerton Mfg. Co.

Improved Blue Pigments

THREE new phthalocyanine blues with superior characteristics have been announced by Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York, N. Y. Developed in the labortaories of Thomasset Colors, Inc., the new colors are Aquamarine Blue #1670, Synthaline Blue #1950, and Synthaline Blue Flushed #1949.

Aquamarine Blue #1670, a 20% blue in paste form, is dispersed in water and contains a dispersing agent. Application tests indicate this pigment to be particularly suitable for latex emulsions, water paints and colors, wallpaper colors, and natural and synthetic leather finishes. The new color is also said to be better than Whittaker's former Aquamarine Blue #1680 because of superior compatibility, color strength, and dispersion, and it does not agglomerate in emulsions. The new pigment can be mixed in latex-type emulsions without grinding and is compatible with all commercially available latex emulsion paints.

Synthaline Blue #1950 is a dry, non-dusting, non-crystallizing pigment that features ease of grinding and dispersion, and low oil absorption. It differs from Whittaker's Synthaline Blue #1952 in easier dispersion, increased strength, redder tone, and softer feel. Blue #1952 is more brilliant, however, and is preferred for use in vinyl sheeting. Synthaline Blue Flushed #1949 consists of 20% blue, 40% long oil alkyd, and 40% solvent. Potential uses are in the manufacture of paints and enamels. This pigment requires no further milling, has soft body, provides complete resistance to crystallization, and is easy to disperse in paint vehicles.

Drogin Guest Speaker

A TALK on "Methods Employed in Compounding Research" by Isaac Drogin, United Carbon Co., featured the March 11 dinner-meeting of the Ontario Rubber Section, C.I.C., held at Hart House, University of Toronto, Toronto, Ont., Canada, with 50 members and guests attending. Dr. Drogin noted that compounding was originally an art, but through research has now been developed into a science. After giving a comprehensive outline of testing methods and principles, the speaker showed how these methods can be applied in the investigation of rubber stocks or the development of products for specific applications.

Morton on Alfin Rubbers

A TALK on "Alfin Rubbers—A New Type of Polymer" by A. A. Morton, Massachusetts Institute of Technology, was featured at the March 4 dinner-meeting of the Buffalo Rubber Group, at the Hotel Westbrook, Buffalo 6, N. Y., with 46 members and guests present.

In comparison with the slow sodium polymerization method for butadiene where a 1,2 addition takes place, the Alfin polymerization methods is extremely fast and results in a 1,4 addition, Dr. Morton explained. Work at MIT has shown that although numerous compounds may be used in the Alfin process, the ionic structure of the compound must be of specific size, shape, and dimension, and the process is very sensitive to poisons. The Alfin polymer is of very high molecular weight and can be vulcanized without sulfur. Features of the Alfin rubbers include good abrasion resistance, good flex life, and resistance to heat. The speaker also compared the properties of the Alfin rubbers with those of other rubbers, using slides to illustrate his talk.

Walter Dornberger, Bell Aircraft Corp., then spoke on "Guided Missiles."

The Group's next meeting will be the annual international meeting with the Ontario Rubber Section, C.I.C., to be held May 16 at the General Brock Hotel, Niagara Falls, Ont., Canada.

Oil-Extended Rubber

THE rapid strides of the synthetic rubber industry in developing and producing oil-extended synthetic were discussed by James D. D'Ianni, Goodyear Tire & Rubber Co., in a talk before the March 11 meeting of the Trenton Section, A. C. S. The oil-masterbatch process, as developed by Goodyear, went into commercial production at Houston, Tex., on March 10, 1951, using 25 parts of a special processing oil per 100 parts of butadiene-styrene latex. In exactly one year and one day, on March 11, 1952, a 50% increase in the amount of extending oil (to 37.5 parts per 100 parts latex) was found possible without any impairment of quality.

Further studies are being made at Goodyear with the objective of utilizing the maximum amount of oil without sacrifice of quality, Dr. D'Ianni said. Increasing the amount of oil used can well affect price of the finished rubber, since 137.5 pounds of this rubber can be made for the same price as 100 pounds of conventional cold rubber plus the low cost of the extending oil. The synthetic rubber industry is now producing oil-extended rubber at the rate of over 10,000,000 pounds per month, Dr. D'Ianni reported. This output can be increased by means of only slight plant modifications. Oil-extended rubber is now being made by five other government owned plants in addition to Goodyear-Houston, as follows: Copolymer Corp. at Baton Rouge, La.; General Tire & Rubber Co. at Baytown, Tex.; Phillips Petroleum Co. at Borger, Tex.; B. F. Goodrich Co. at Port Neches, Tex.; and Midland Rubber Co. at Torrance, Calif.

Hear Panel Discussion

APPROXIMATELY 50 members and guests of the Northern California Rubber Group attended a regular meeting on March 6 at the Berkeley Elk's Club. The technical session consisted of a panel discussion led by Jos. Hollister, Mare Island Naval Shipyard. Among the subjects discussed were the adhesion of rubber to metal, and the effect of variations in bank and batch temperatures during mixing upon subsequent storage of rubber stocks.

In the business session two new members were welcomed into the Group: Miss Ruth Hatch, Pacific Rubber Co.; and Al Subrin, H. Muehlstein & Co. Ray Bitter, B. F. Goodrich Chemical Co., extended an invitation to the Group members to attend the coming annual summer outing of The Los Angeles Rubber Group, Inc.

Improved HAF Huber Black

AN IMPROVED quality of high abrasion furnace black, Aromex 115, was announced last month by J. M. Huber Corp., 100 Park Ave., New York 17, N. Y. Road tests are said to have demonstrated longer tread wear, especially with synthetic rubber stocks containing this black. Aromex 115 is also claimed to impart high electrical conductivity to rubber stocks and to feature good processing characteristics. The black is available in pellet form in either bulk or 50-pound bag shipments.

Sulfur Changing Color

RUBBERMAKERS' sulfur in an off-yellow color will soon be reaching the rubber industry, according to R. H. Walcott, technical director of industrial sales, Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y. The most important commercial deposits of sulfur occur in sedimentary beds associated with hydrocarbons, and such deposits or "salt domes" exist along the Gulf Coast in Louisiana and Texas. Yellow sulfur of better than 99.5% purity has been pouring from these deposits for nearly 50 years and, until a few years ago, in quantities sufficient to supply the United States and much of the foreign demand for elemental sulfur.

With the depletion of the older workings, the sulfur from some of the more recently developed deposits shows some new qualities. So-called "dark" sulfur has been produced and supplied to the chemical industry for a number of years. It now appears that more and more American crude sulfur will be of this dark type. Rubbermakers' sulfur made directly from these new crudes will be off-yellow or beige in color, but there is no practical reason for believing that its performance will be different or less satisfactory than that previously supplied.

Purity of the darker rubbermakers' sulfur will remain at 99.5% or better. The organic impurity fraction will rise slightly and include more free hydrocarbon oil than is normally detected in the native yellow crude sulfurs. This free oil content may run as high as 0.1% and be associated with an equal fraction of a variable complex of organic sulfur compounds. Yellow crudes have contained these or closely similar impurities in slightly smaller fractions. The difference in color would appear to indicate a change in the composition of the oil content, Mr. Walcott said.

SORG Hears Livingston

THE spring meeting of the Southern Ohio Rubber Group took place March 20 at the YMCA, Dayton, O. The program included a dinner, business meeting, and technical session, and the meeting was attended by 99 members and guests. Technical speaker was Larry F. Livingston, E. I. du Pont de Nemours & Co., Inc., on the subject, "Progress in Better Living."

Using many samples of products made from nylon, neoprene, Orlon, Lucite, cellulose sponge, and other du Pont products, Livingston pointed out that industrial research and its translation into products are the major factors behind the continued improvement of living conditions in the United States.

"We have our high standard of living because we have a vast industrial system in this country that converts raw or unfinished materials into useful products, which are the true wealth."

S. G. Byam, of du Pont and vice chairman of the Rubber Division, A. C. S., also spoke on liaison between the Division and its sponsored local rubber groups. Mr. Byam also reminded his listeners of the availability of the technical library at the University of Akron for use by Division members.

Additional Experimental GR-S Polymers and Latices

THE table below gives the additions and changes in the list of experimental GR-S polymers and latices authorized by the Synthetic Rubber Division RFC, during the period from December 15, 1951, to January 25, 1952.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of one bale or two bales upon request to the SRD Sales Division, or will be held for six months after the experimental polymer was produced, unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

These new polymers are experimental only, and SRD does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers or the results to be obtained from their use.

X-Number Designation	Polymer Description	Remarks
	Changes in Previously Announced Polymers	
X-674-SP GR-S and X-496-SP GR-S	Mooney viscosity of polymer, 80±5 (ML—4 at 212° F.). Former range was 70±5.	Tape manufacturers have found that the higher Mooney viscosity of the polymer improves the quality of their product. It is expected that X-674 will entirely replace X-496.
	New Polymers and Latices	
X-694 GR-S	A butadiene-styrene copolymer containing 23.5±1% bound styrene; polymerized at 122° F. in a fatty acid emulsified system; activated with cumene hydroperoxide and dextrose; and shortstopped with sodium dimethyl dithiocarbamate plus adjunct (sulfur or polyamine). Hydrocarbon conversion is approximately 72%. Polymer Mooney viscosity, 50±4 (ML—4 at 212° F.). Stabilizer, 1.25% Stalite on the rubber.	X-694 is the same as the obsolete 23.5% bound styrene GR-S-50, except that the recipe has been activated to permit faster reaction rates in the copolymer plants, and the non-staining carbamate shortstop has replaced hydroquinone. Very limited quantities of X-694 will be produced for use only in those mechanical goods applications where it can be shown on a sound technical basis that 23.5% bound styrene is absolutely essential to maintenance of reasonable product quality.
X-695 GR-S Latex	Type II GR-S latex to which 40 p.p.m. (on the latex) of formalin has been added.	The addition of formalin should inhibit the growth of odor producing bacteria in Type II latex. Addition of ammonia (see X-523 latex) is very effective, but the ammonia odor is undesirable in food products. It is believed that 40 p.p.m. represents a permissible concentration of formalin in food products.
X-696 GR-S	A mixture of 25 parts of aromatic processing oil (Sundex 53) and 100 parts of a base polymer identical with GR-S-100, except that the reactor Mooney viscosity is 110±7 (ML—4 at 212° F.).	This staining, general-purpose oil-enriched cold rubber is similar to X-660, except that Sundex 53 replaces Circosol-2XH. Limited tests indicate that polymers masterbatched with Sundex 53 may be somewhat better processing than those masterbatched with Circosol-2XH. The lower Mooney viscosity of X-696 (the Mooney viscosity of the masterbatch should be approximately 60 ML—4) should also improve processing.
X-697-SP GR-S	A butadiene-styrene copolymer containing 12±1% bound styrene; polymerized at 41° F. in a fatty acid emulsified, peroxamine activated system; and shortstopped with sodium dimethyl dithiocarbamate. Hydrocarbon conversion is approximately 60%. Polymer Mooney viscosity, 52±7 (ML—4 at 212° F.). Glue-acid coagulation. Stabilizer, 1.25% Polygard (ELGI) on the rubber.	X-697-SP is a non-staining, low styrene cold rubber specifically designed for use as a wire and cable polymer for arctic service. The 12% bound styrene is believed to represent the best balance of all low-temperature properties. X-697-SP should be a superior replacement for X-601-SP.
X-698 GR-S	GR-S-101 reacted to 72% hydrocarbon conversion. Sulfole has been substituted for MTM as the modifier, and the rosin soap charge has been increased from 4.0 parts to 4.5 parts.	X-698 at 72% conversion should be equivalent to GR-S-101, a general-purpose, staining cold rubber produced at 60% conversion. Tire tests have shown that cold rubber at 72% conversion is equivalent in tread wear to the same cold rubber at 60% conversion. All consumers of general-purpose cold rubber should evaluate X-698 to determine whether quality of product is significantly affected. It is possible that all cold rubber will be polymerized to 72% conversion if it is found that there is no significant quality difference between 60% and 72% conversion cold rubber.

New Subscription Rates

On and after April 1, 1952, the subscription price of India Rubber World will be $5.00 a year in the United States and Mexico, $6.00 in Canada and $7.00 in all other countries. Single copies in U. S., 50c; elsewhere 60c.

The former subscription price was established in October, 1890—more than 60 years ago—during which period publication costs in all departments have multiplied manifold and to a point where increased revenue is essential to offset losses on all subscriptions.

Low-Temperature Royalite

A NEW type of Royalite thermoplastic sheet that will withstand high impact at very low temperatures was announced by United States Rubber Co., Rockefeller Center, New York 20, N. Y. Called low-temperature Royalite EBMU, the material has an izod impact of 6.5 foot-pounds at —50° F., and a tensile strength of 2,800 psi. It is being made in sheets in four sizes, as follows: 50 x 62 inches; 54 x 70 inches; 50 x 84 inches; and 54 x 90 inches.

Coe Receives CCDA Award

MORE than 500 members and guests representing over 100 companies in the chemical and allied industries attended the annual open meeting of the Commercial Chemical Development Association at the Hotel Statler, New York N. Y., March 20.

The 1952 honor award for outstanding work in commercial chemical development was presented to John P. Coe, vice president and general manager of the Naugatuck Chemical Division, United States Rubber Co.

In his award address entitled, "The Unseen Element," Mr. Coe pointed out that in the final analysis it is people that determine the success or failure of commercial chemical development and called for an increasing awareness and a greater study of the people involved in it. He discussed, in turn, the people who make the chemical products, the people who invest their money in the chemical companies, the public or the consumers of the products, and the people in government, and how the commercial chemical development men are involved with all these people.

"We must learn to be better leaders of men. We must add to our technical and professional expertness the qualities of kindness, unselfish interest and, above all, a sympathetic understanding of people," he declared

Coe also made a strong plea for the government to get out of the synthetic rubber business. Speaking of the government synthetic rubber program, he said:

"The program itself was a good program and well handled, and the war needs were met. But the dangerous point is that seven years after the war, the government is still owning and operating the business. Every two years, Congress has said that, of course, the best defense security requires a privately owned synthetic rubber industry—but not yet. The President is now recommending still two more years of government ownership, and others talk of three years more.

"I believe it is time for the government to get out of the rubber business. I believe that synthetic rubber is ready now to be run by the people in the true spirit of free competition.

"It is a great chemical development — but it is not commercial. It has never had to stand trial by competition. It has never had to pay income taxes or to provide dividends for its capital. It is an athletic young man still walking around in a baby's toddler.

"I think it can walk alone, and I'd like to see it tried. But you cannot try it free-enterprise fashion against a government monopoly. When the government establishes a monopoly, it really does it," Coe stated

Donald B. Keyes, chemical consultant and chairman of the morning session, sounded the keynote for the day-long meeting with a plea for commercial chemical development men to organize better to carry out their work Development men have the enormous burden of the company's future on their shoulders, he said, in translating the discoveries of chemical research into useful, profitable products.

J. Oostermeyer, president, Shell Chemical Corp., supported the position taken by Dr. Keyes in stating that the development men were the backbone of a chemical company. As such, these men should have ready access to the highest echelon in the management, should be in a position to keep continually abreast of current and projected research programs, should have a thorough understanding of the company's manufacturing position, and finally, should be continually abreast of current business conditions and of future forecasts of broad economic conditions.

John L. Davenport, executive vice president, Chas. Pfizer & Co., Inc., emphasized that the coordination of new products through a company is a complex and difficult job. Without the knowledge of the current status of all new products within a company based on fact finding, future planning of individual products and smooth integration of many products cannot be carried out, he declared. Whether this coordination is done by an individual, by a department, or by a department within a department, these basic factors are still a requirement for success full commercial chemical development in all fields of the chemical industry, he added

John C. Leppart, executive vice president, Mathieson Chemical Corp., said that the product development department should be headed by a man of vice president rank and by a man of such stature as to merit this title.

Kenneth H. Klipstein, assistant administrator, NPA Chemical, Rubber & Forest Products Bureau, pointed out that, whereas only a few strategic metals need to be dealt with through controls and expansion goals, numerically many more chemicals have to be included in expansion and similar listings.

One reason is the complexity of the chemical industry, where 10, 20, or 50 products may be required to produce a single end-product.

Fundamentally the chemical industry should be classed as a supplier of basic raw materials and processing agents or operating supplies for other industries. As national industrial production expands, the chemical industry must keep pace, since synthetic products can be used as substitutes for natural materials.

Charles W. Walton, Minnesota Mining & Mfg. Co., was elected president of the Association for the year. Wayne E. Kuhn, Texas Co., is vice president and president-elect. Other officers are: Lester E. Johnson, U. S. Industrial Chemicals Co., executive secretary; and Nolan B. Sommer, Jefferson Chemical Co., Inc., treasurer.

Winkelmann on Aging

APPROXIMATELY 125 members and guests of the Thiokol Technical Club attended a dinner-meeting on March 19 at the Thiokol Corp., Trenton, N. J. Speaker of the evening was H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg Corp., who discussed "Weather Aging of Natural and Synthetic Rubber."

Dr. Winkelmann pointed out that variations in atmospheric ozone concentrations between different localities, and between seasons at a given locality, are so great as to prevent the setting up of a standard laboratory procedure for the aging of rubber until more data are accumulated on prevailing natural conditions. Such data are now being gathered by means of measurements of ozone concentrations and rubber aging effects at 19 locations over an 18-month period. When complete, these data will be used to set up a dependable, standardized laboratory test for rubber aging.

Stiehler Group Speaker

APPROXIMATELY 60 members and guests of the Washington Rubber Group attended the March 19 meeting, held in the Pepco Auditorium, Washington, D. C. Featured speaker was Robert D. Stiehler, National Bureau of Standards and a member of the Group, who reported on visits to rubber laboratories in England, Holland, and France.

Some of the more promising projects being worked on in attempts to improve specific properties of natural rubber were reported as: (1) the production of oil resistant rubber by heating the latex with acrylonitrile and a catalyst; (2) the reinforcement of natural rubber by means of synthetic resins in order to get increased strength and tear resistance; (3) the use of mica or aluminum powder flakes in natural rubber inner tubes to decrease their permeability to air; (4) the use of positively charged latex for treating wool; (5) Cyclization of natural rubber latex; (6) preparation of high-quality rubber of uniform plasticity and rate of cure.

The Godfrey L. Cabot Co. color-sound film, "A Study in Black," was also shown at the meeting. A pre-meeting dinner for the speaker was held at the Touchdown Club. Outing Committee Chairman Roy J. Devereaux, B. F. Goodrich Co., announced that the membership will be canvassed on the suitability of a June outing and golf tournament at the Annapolis Road Club, Annapolis, Md.

Neoprene Solutions

"NEOPRENE Solutions" were discussed by Andrew Mitchell, E. I. du Pont de Nemours Co., Inc., at the February 14 meeting of the Elastomer & Plastics Group, Northeastern Section, A. C. S. Some 30 members and guests attended the meeting held at Massachusetts Institute of Technology, Cambridge, Mass.

Early neoprene coatings were unsuccessful because of their low solids contents and the need of heat treatment to effect cure, Mitchell said. The ability of Neoprene Type KNR to be more highly plasticized than the other grades permits the preparation of high solids content solutions that deposit thick coatings. The greater plasticization and use of high mineral filler and pigment loadings give solutions that are not stringy, can be brushed readily, dry quickly, and have long working life. For cured coatings, use of a litharge-Accelerator 833 curing system provides for flexibility in curing range and improved pot life. In addition to use as marine and chemically resistant coatings, stable Type KNR solutions are being used as putties and caulking compounds by incorporating accelerators, high carbon black loadings, and using oil instead of volatile solvents.

The ability of a neoprene to freeze or crystallize rapidly at room temperature permits the preparation of adhesives which develop strength rapidly and possess high uncured strength. This crystallization rate can be controlled, and it is possible to prepare neoprene polymers ranging from some that crystallize within minutes to others that crystallize so slowly that the effect is negligible for practical purposes. Of the available polymers, Types AC and CG crystallize quickly; Types W, GN, GN-A, and KNR have moderate crystal-

(*Continued on page* 128)

NEWS of the MONTH

Another Two-Year Rubber Act Extension Likely; Natural and Synthetic Rubber Prices Reduced

GR-S production at 800,000 tons a year, instead of 860,000 tons a year is contemplated for 1952. Price was reduced to 23¢ a pound. House Armed Services Committee suggests that synthetic rubber prices be reanalyzed with a view to increasing selling prics to a level "that private industry may normally be expected to charge as such time as private industry acquires the facilities."

This same House committee acted, however, to prevent private industry from acquiring "these facilities" in the near future by recommending a flat two-year extension of the Rubber Act until 1954.

The committee would be opposed to any effort, at this time, to treat the whole synthetic rubber program as anything other than an integral and inseparable part of our defense program," it was said.

Meanwhile the Senate Small Business subcommittee on rubber planned hearings on the rubber program for March 27 and 28, which may provide new information on the government's future rubber plans.

The Office of Price Stabilization organized and set in motion during March an industry committee to help it develop a "price control pattern" to govern the direct after the government steps out as exclusive buyers on June 30.

The removal of price control on tires and the ban on white sidewall tires was being considered in Washington during March. The white sidewall ban was lifted on March 26 by NPA.

A considerable number of tire manufacturers and a large group of independent tire dealers filed suits in Federal District Court in Washington during March seeking both temporary and permanent injunctions to stop the Federal Trade Commission from putting into effect on April 7 an order limiting the quantity discounts granted by manufacturers on sales of replacement tires and tubes.

The United Rubber Workers, CIO, indicated that it would ask for an "equitable" pay raise for its members and an increase in the $100-a-month pension plan, when contracts are reopened this summer.

Washington Report

By

ARTHUR KRAFT

RFC, Synthetic Rubber Division Output

While the RFC still continues to talk of expanding its GR-S production to an annual rate of 860,000 long tons by June, at least in its official statements to the public and the industry, the agency actually is planning to hold to about an 800,000-ton level through the balance of this year. This means a partial, but very significant, realization of the expansion program put into effect last fall, which called for adding 100,000 tons to the 760,000-ton annual capacity then existing.

What has been realized to date is significant because it has been brought about primarily by expanding production of petroleum-based GR-S, the kind RFC used to sell at 18.5¢ a pound and produce at a fraction of a cent less than that. This expansion made possible the recent reduction in RFC's selling price of from 26 to 23¢ a pound. The 23¢ price, it was reported, has been predicted on an 800,000-ton annual production rate for the balance of the year, including only about 203,000 tons (some say 190,000) of alcohol-based GR-S, the kind that costs upward of 35¢ a pound to produce.

The 26¢ price was introduced last September, when RFC was planning on an annual production rate of 860,000 tons of GR-S, of which about 31%, or 266,000 tons, would be based on alcohol butadiene. The 26¢ price was intended to cover such a program. But instead of adding 100,000 tons of GR-S capacity mostly based on alcohol butadiene, the agency has added some 40,000 tons of GR-S, while trimming its projected alcohol-based GR-S total more than 60,000 tons. Other factors contributing to the 3¢ price reduction were revisions in estimates of the costs of acquiring alcohol and of producing alcohol butadiene. Experience has shown these original estimates high by 14 and 11%, respectively. While RFC is operating its petroleum butadiene facilities at capacity, it is operating alcohol butadiene facilities at some 70% of capacity. Two of the seven alcohol butadiene streams still are idle.

Whether these streams, each capable of producing about 20,000 tons annually, will be put into operation is still problematical. They represent high-cost GR-S, and the current production seems adequate to meet industrial demand, permit RFC to restore its inventories to normal levels, and still leave some tonnages for export. Also, RFC has been reported to have run into difficulty recruiting the skilled technicians needed to operate such facilities.

An "unauthorized" walkout—so labeled by an official of the union involved—curtailed operations from March 3 to 10 at the Port Neches, Tex., synthetic rubber plant, operated by United States Rubber Co. Full operations were resumed March 11, when 25 members of the AFL International Association of Machinists agreed to remove pickets so that talks with the company could continue. The plant was shut down briefly when members of the CIO Oil Workers International Union refused to cross the IAM picket line. The IAM then released the OWIU from any obligation to honor the picket line, and the oil workers returned to their jobs. An IAM official said the walkout had been "unauthorized" because the union's contract runs until May 24 and contains a "no strike" pledge.

A far graver threat to synthetic rubber production was averted—or perhaps just postponed—when President Truman last month referred some 90 wage disputes, including several at synthetic rubber plants, for review and recommendation to the Wage Stabilization Board. A number of unions—22, including the OWIU and various AFL and independent unions, were involved. The unions had banded together to enforce a demand for a 25¢-an-hour wage increase from scores of companies, almost all of them oil firms. The President's action, which may lead to a settlement, came after the unions twice postponed "nationwide" strike deadlines at the request of the Federal Government.

The B. F. Goodrich Chemical Co. announced in mid-March that it had developed a new process, using existing plant facilities, which permits a 30% increase in output of cold GR-S rubber. Now in use at the government-owned Port Neches plant, the new process increases reaction rates 30% or more. Overall cost of the rubber is lowered; the rubber is appreciably more uniform in quality, and the process requires less exacting technical control, it is claimed.

Water used in making the cold (LTP) GR-S latex is treated with a tetra-sodium salt of ethylene diamine tetra-acetate, which forms complex compounds with the iron, calcium, and magnesium ordinarily found in water.

Time required for the rubber making reaction is decreased by three to four hours, which results in more rubber produced in each polymerizer during a given period. By using the water treating chemical, smaller amounts of catalysts are necessary.

This latest improvement brings the reaction time for cold GR-S down to approximately nine hours. Information on the new process has been made available to other companies operating GR-S plants for RFC.

RFC Personnel

Harry A. MacDonald, RFC Administrator, announced, March 10, the appointment of J. Ernest Miller as assistant to the chief of the RFC Synthetic Rubber Division.

Mr. Miller assumed his new duties March 18. He is on leave for government service from Goodrich Chemical and since 1945 has been plant manager of the RFC synthetic rubber plant at Port Neches.

Leland E Spencer, chief of the Synthetic Rubber Division, RFC, now has Mr. Miller as assistant and R. V. Clendenin as special assistant.

RFC's Synthetic Rubber Division is divided into seven branches under Mr. Spencer, as follows: Research and Development, Sales, Materials Procurement, Plant Operations, Engineering and Maintenance, Administrative, and Traffic.

The Research and Development Branch is headed by P. S. Greer, with C. W. Gay as assistant. This branch is in turn divided into a polymer research section headed by T. H. Swan, a polymer development section headed by A. L. Hollis, an applied development section headed by

G. B. Krantz, a monomer section, a tire testing section headed by I. J. Sjothun, and a technical publications section headed by S. J. Wacher.

The Sales Branch has S. D. Morgan as chief. The operating section is headed by A. E. Bailey; there are also technical service and marketing statistics sections, but no one is heading up these sections at the present.

G. B. Hadlock is chief of the Materials Procurement Branch. W. E. Burch heads the procurement section, and H. L. Repass the distribution section.

W. H. Munster is chief of the Plant Operations Branch. The copolymer section is headed by A. E. Jury; the butadiene and styrene section by V. L. Keldsen; production control section by E. R. Gurtler; and the safety section by H. J. Joy.

The Engineering and Maintenance Branch has G. J. Irwin as chief, and R. R. Heckman as assistant. The plants engineering section is headed by C. G. Webb; the administrative section by A. L. Schwarz; the priorities section by S. D. Licklider; and the utility section by C. A. Baer.

A. V. Krone is chief of the Traffic Branch, and J. P. Bartlett is his assistant. The freight traffic section is headed by P. H. Koelker; the tank car section has no head at present; the claims section is headed by J. J. Maher; and the insurance section by J. E. Spaulding.

No information on the personnel or organization of the Administrative Branch is available.

GR-S Price

The House Armed Services Committee "suggested" in March that the government reanalyze its system of pricing synthetic rubber, with the end in mind of increasing selling prices to a level "that private industry may normally be expected to charge at such time as private industry acquires the facilities."

The suggestion came as the windup to a seven-page committee report, signed by Representative Paul W. Shafer (Rep., Mich.) for a unanimous committee. The report was filed on March 13 to accompany H. R. 6787, Chairman Vinson's bill to continue the Rubber Act of 1948, as extended, for another two years beyond this June 30.

The committee's report followed by one week an announcement by RFC of a 3¢-a-pound reduction in the selling price of GR-S, which took effect March 8. The new price is 23¢ a pound. Four days later RFC distributed a memorandum to all rubber consumers spelling out the new price list for its various types of polymers, including latices. The 3¢-a-pound cut represented an average covering total GR-S output. Actually the reductions varied from 1¾¢ a pound for higher solids latices to 4.5¢ a pound for low solids latices. This price list is the first drawn up by the agency employing accurate cost data on a polymer-by-polymer basis and is the product of a long and thorough analysis of costs, translated to a cents-per-pound basis, of each step used in producing the various types of GR-S [See page 144 for the complete RFC price list. EDITOR.]

The "suggested reanalysis" sought by the House Armed Services Committee would cover some additional and probably not scientifically ascertainable costs, such as, sales promotion, sales effort, and income taxes. The committee said that the present selling price of GR-S omits such costs which would be incurred by a private owner of the same plants. The committee noted that RFC reported a net income on its synthetic rubber operations in fiscal 1951 of nearly $12 million, and that its selling prices for GR-S have fluctuated from 18.5¢ a pound to 24.5¢, then to 26¢ and most recently down to 23¢. At this point, the committee report commented:

"It appears to the committee that these fluctuating prices in GR-S may adversely affect the eventual disposal price received by the Government when the synthetic rubber facilities are sold to private industry. The Government now enjoys a practical monopoly in synthetic rubber. But, in selling a product which in the near future may well become a major manufacturing field for private industry, there would appear to be no reason why the selling price determined by the Government should not reflect more closely the selling price that private enterprise would expect if private industry were operating the plants. The present selling price of synthetic rubber omits certain sales expenses, since no advertising is involved, and no sales persons are involved. No provision is made for income taxes, and the Government in determining the selling price of synthetic rubber has included interest on Government funds invested at a rate which probably is lower than that which would be obtained by private borrowers from private lenders. In other words, the return on the Government investment would appear to the committee to be well below that which private industry engaged in a relatively new industry would demand. For these reasons, it would appear to the committee that the price of synthetic rubber charged by the Government should more closely coincide with the price that private industry may normally be expected to charge at such time as private industry acquires the facilities.

"However, with the exception of a suggested reanalysis of the pricing system for synthetic rubber, the committee is of the opinion that the administration of the Synthetic Rubber Act has been satisfactory in all other respects . . ."

In late March no official comment was made on the committee's suggestion, which, as noted earlier in this account, came as part of a report which "strongly" recommended that the government be required to hold on to its synthetic rubber facilities for two more years. What reaction there has been strongly suggests that the concept introduced by the committee probably will not be implemented, except perhaps for some long range study, in the near future. One observer—not an RFC official—has noted that the agency's rubber operation is conducted on a business-like basis, with an ample fund set aside for contingencies. The net profit of nearly $12 million was earned on an annual sales volume of $257,800,000. RFC has estimated a net income in the year ending June 30, 1952, of $17,611,000 on estimated sales of $555,575,000.

As far as it could be learned, the committee's suggestion had come in for discussion at RFC in the past year. A former official of that agency had brought it up, it was reported, at meetings of the RFC rubber industry advisory committee, whose members include top echelon executives of both large and smaller rubber goods manufacturers operating GR-S plants for the government. It is believed, however, that within RFC the suggestion was meant to dovetail with an actual plant disposal program—that is, having a price boost come shortly before the plants were sold. However far this proposal might have gone within the agency, it was not mentioned in the Administration's January report and recommendation to Congress on the rubber plant disposal question. The President, in that report, recommended against disposal of GR-S facilities for at least another two years.

To get back to RFC's new price list, the lowest-price polymer being sold is GR-S, X-691, one of the new cold (LTP) GR-S-oil-black masterbatches. The selling price of this material is 14.75¢ a pound. It contains 100 parts of GR-S to 40 parts Circosol 2XH to 77 parts Philblack O. In computing this selling price, RFC prices the GR-S element (which is less than 50% of the total weight of the masterbatch) at 23¢ a pound and the oil extender and carbon black at their respective costs (roughly 3¢ a pound or less for the oil extender and 7.5¢ a pound for the carbon black). To this is added ½¢ a pound in processing charges for putting the oil into the compound and a like charge for the addition of the carbon black. These latter charges are standard with RFC for all polymers containing either carbon black or oil extender.

GR-S Export

Expectations that European and other overseas rubber consumers would eagerly take up all the American-made GR-S they could lay hands on have not been justified. As against a first-quarter, 1952, quota of 17,000 long tons, which was oversubscribed by exporters, less than 3,500 tons had been bought by these same exporters as of mid-March, when the quarter was nearing its close. Whether even this small quantity actually has been shipped overseas is not known for certain.

The first-quarter quota, actually a 10,000-ton original quota plus a supplemental quota of 7,000 tons, marked the adoption of a new policy of permitting substantial exports of GR-S. Previously, because domestic needs exceeded production, GR-S exports were virtually banned, with only a trickle moving overseas for experimental use.

The Office of International Trade, upon a decision taken by an interagency policy committee, announced the departure in policy late in December, setting January 7 as the deadline for filing applications. Within a few weeks, exporters filed applications seeking permission to buy for export some 25,000 tons in the first quarter. The smaller-than-3,500-ton figure, on the other hand, represents the total of purchase permits sought by exporters from RFC at the end of the third week in March. It should be noted that OIT completed the allocation of the quota in February and actually issued most of the allotments in January. Issuance of RFC purchase permits has been automatic to those exporters coming in with approved OIT authorizations.

The disappointing showing has been a matter of some concern and bewilderment to officials here, who confidently expected the full 17,000-ton quota to be translated quickly and eagerly into shipments overseas. The more optimistic explanation, based on advice from veterans in the export trade, points to the early record as purely a transitory matter. The Government's action in permitting large-scale export of GR-S, this explanation runs, opened an entirely new export trade, and in such cases it normally takes some four months to establish trade relations and particularly to establish letters-of-credit. This latter is most difficult at a time when most prospective importers must justify to their governments the release of scarce American dollar exchange. Those who subscribe to this ex-

planation feel that it is still too early to pass judgment on whether the 17,000-ton quota—and the still larger applications from American exporters—realistically reflects overseas buying desires for American GR-S. As far as this reporter has been able to ascertain, no responsible officials hold a contrary opinion, although some are naturally skeptical.

In any event the interagency committee to whom the task falls, was discussing in late March the establishment of an April-May-June quota of 20,000 tons, again including an initial quota of 10,000 tons plus a supplemental quota of 10,000 tons. There was also some opinion that, in view of the first-quarter record, an open-end quota might be justified—that is, setting no ceiling figure (although an unofficial, or unannounced, ceiling could still be used as a check against excessive exports). While this determination was still being discussed, the committee authorized OIT to start accepting applications for licenses to export in the second quarter. OIT, on March 13, announced that such applications must be filed before March 31. The agency also announced some relaxation in the data it requires exporters to file. License applicants no longer need show import license or authorization numbers on their applications, nor must they indicate the period of time in which the amount of GR-S covered by their applications will be consumed. These are data which the prospective exporter would have to get from his potential overseas customers. OIT said these relaxations "were made possible by the easing of GR-S supplies"—a first-class understatement in view of the meager exports to date.

Meanwhile OPS on March 12 announced the establishment of ceiling prices for export sales of GR-S, issuing Supplementary Regulation 2 to Ceiling Price Regulation 61. This regulation, effective March 17, permits exporters to apply markups of 3% for sales in carload lots and 3½% for sales in less-than-carload lots. In each case the markups may be applied to the costs of acquisition at the point of production—in most cases the 23¢-a-pound price at which RFC sells f.o.b. point of production.

To the export ceiling price may be added costs of exportation—actual costs of packaging, ocean freight and insurance and lighterage—plus delivery charges of $1 per hundredweight in carload lots and $1.60 per hundredweight for less-than-carload lots. The latter are the permissible delivery charges as determined by RFC.

In passing, it may be noted that the government splits its GR-S export quota into initial and supplemental quotas partly as a device for determining the amount of cold (LTP) GR-S to be made available for export. The initial quota in the first quarter provided a proportion of cold to hot GR-S identical to that permitted domestic users. The initial 10,000 tons included, therefore, 4,600 tons of cold GR-S, 46% of the quota. The supplemental quota was all standard GR-S.

Rubber Act Extension

As March drew to a close, all signs pointed to another two-year extension of the Rubber Act of 1948. Such action was recommended March 11 by a unanimous vote of the House Armed Services Committee and reported to the House for consideration and vote. The House voted in favor of the two-year extension on March 25. Meanwhile, Sen. Lyndon B. Johnson (Dem., Tex.), to whose Armed Services subcommittee on rubber the matter was referred, decided March 14 to take no action until the House acts. In effect, this decision meant that the Senate subcommittee would wait for an opportunity to act on the House bill. The Senator has not disclosed whether he intends to conduct hearings on the legislation.

Approval by both houses of a flat two-year extension to June 30, 1954, represents a rebuff to the Administration's qualified request for a Congressional mandate to peel off the two government butyl facilities and sell them to private industry. Although it could not be confirmed from company sources, it was reported, on good authority, that the current operators of these facilities—Esso Standard at Baton Rouge and Humble Oil & Refining at Baytown—had written to RFC Administrator MacDonald confirming their willingness to purchase the butyl plants. Esso Standard was said to have informed MacDonald that it would offer about $18.5 million for the Baton Rouge plant. The Standard Oil Co. of N. J. owns all of Esso's stock and has a two-thirds interest in Humble.

The Administrator's request for authority to sell the butyl plants and the elimination in the Rubber Act of mandatory production and consumption restrictions on butyl were qualified because the President, in so recommending last January, said the Defense Department had advised him that a flat two-year extension of the law would equally well protect the national security. In view of this qualification, it is not surprising that Secretary of Commerce Charles Sawyer was able to report to the House committee on March 10 that:

"This Department is of the opinion that extension of the Act for an additional two-year period is essential in the interests of national defense. Accordingly, we urge the early enactment of this legislation. [H. R 6787—Chairman Vinson's two-year extension. EDITOR.]

"We have been advised by the Bureau of Budget that there would be no objection to the submission of this report to the Congress and, further, that enactment of this legislation would be in accord with the program of the President."

Secretary Sawyer, whose department includes the NPA, seemed, in his brief letter, to have virtually retracted the President's earlier request for authority to dispose of the butyl plants. Since the House committee held no hearings—and acted before it received a requested report from the Administration in further support of butyl disposal—the Secretary's letter was the last official word on the Administration's position. The letter was incorporated in the committee report.

In reporting the Vinson extension, the committee unanimously concluded that world conditions do not justify disposal of synthetic rubber plants at this time or a turning over—presumably by lease—of the plants to private industry. It stated, however, its complete agreement "with the principle of free enterprise" and "strongly" endorsed the "eventual turning over of the Government-owned facilities for the production of synthetic rubber to private industry."

As for peeling off the butyl plants, the committee acknowledged a differing situation with respect to butyl as compared with GR-S, and even agreed that the existing demand for butyl would assure enough production to assure defense needs even if the plants were in private hands.

But, it said, the committee "is of the opinion that the entire synthetic rubber program should be treated as an integral unit of our national defense program. There is need for both GR-S and butyl plants at this particular time. National security has been achieved in rubber through the operation of both the GR-S and butyl plants under Government supervision. While arguments can be made," the committee continued, "justifying an exception in the case of butyl rubber plants, the committee is of the opinion that at this particular time the entire program is operating satisfactorily and for the best interests of the Government. *The committee would be opposed to any effort, at this time, to treat the whole synthetic rubber program as anything other than an integral and inseparable part of our defense program.*" [Italics ours. EDITOR.]

On the question of stockpiling, the committee said the "stockpiling situation with respect to natural rubber has improved considerably in the past two years." The final objective is yet to be attained.

It said that should the Southeast Asia natural rubber supply be lost to this country, we would be "dependent almost entirely upon our synthetic rubber production. To turn these plants or any portion of them over to private industry at this time might well interrupt the continuity of production that today has permitted us to relax our controls over the importation of natural rubber and at the same time has provided us with indisputable security in rubber."

The committee said that on the basis of preliminary estimates of 1952 consumption more than 250,000 tons of natural rubber will be available for stockpiling purposes to the United States this year. The figures it used were a total consumption of 1.3 million tons, comprising 700,000 tons of government-made GR-S, 85,000 tons of butyl, 68,000 tons of privately produced synthetic rubbers, and 460,000 tons of natural rubber. It reported estimates that in excess of 730,000 tons of natural rubber (including latex) will be available to the United States this year from total world production.

The committee also reported its satisfaction with the administration of controls over the past 15 months. It said:

"Insofar as specification, allocation, and inventory controls of natural and synthetic rubber and specification controls of products containing natural and synthetic rubber are concerned, there appears to be rather unanimous agreement that such controls have been effectively and fairly administered."

Aside from the above and a review of administrative developments in the rubber program since 1950, the committee came up with one new suggestion: that the government consider increasing the selling price of synthetic rubber. This suggestion is discussed elsewhere.

The bill reported by the committee would require the President to report to Congress by April 1, 1953, on the development of a disposal program and to recommend disposal legislation, after consulting with the National Security Resources Board, by the following January 15.

The report (No. 1513) filed by the House committee was written by Representative Shafer. Although Mr. Shafer sought to modify it in 1950, the Rubber Act of 1948 bears his name and is largely of his authorship. Rep. Carl Vinson

(Dem., Ga.) is chairman of the House committee.

Gillette Subcommittee

The Senate Small Business subcommittee on rubber, headed by Sen. Guy M. Gillette, announced hearings scheduled for March 27 and 28 in Washington on the rubber program. The subcommittee, which originally set hearing dates earlier in the month, but then postponed them, said the purpose of the public inquiry is to obtain a "progress" report from government officials and the industry.

It has been some six months since the subcommittee last conferred with its small-company industry "watchdog" committee, appointed more than a year ago to keep tabs on the effect on small firms of the government's rubber program. Appointment of this industry committee, headed by Donald F. Pratt, president of Durkee-Atwood Co., came during the course of the protracted public hearing, chiefly into administration of NPA rubber controls, held by the Gillette subcommittee 14 months ago.

Mr. Pratt is expected to testify at the new hearings and to call attention to the reportedly sharp rise in imports of white sidewall tires and other natural rubber products which the M-2 Order of NPA prohibits domestic manufacturers to produce. It may be recalled, that NPA—over the objections of its Rubber Industry Advisory committee—last spring lifted its ban on the importation of rubber products failing to meet domestic M-2 product specifications.

Others expected to testify include top officials of the General Services Administration, the RFC, and NPA. While it cannot be predicted with certainty, these hearings are expected to turn up fuller explanations, if not brand new information, on the government's future rubber plans.

Natural Rubber Price Control

OPS organized and set into motion during March an industry committee to help it develop a "price control pattern" to govern the direct purchase and sale of natural rubber after the government steps out of the picture as exclusive supplier on June 30. OPS officials met with the committee for the first time on March 18, when the problem was first explored. It was reported that members of the committee advised that earliest deliveries are expected early in May. These will be natural rubber latex for which orders were placed during February, subject to GSA import permits. GSA is expected to have worked off all its natural latex stocks by early May. The agency had promised to lift the bars on consumption of privately purchased natural latex as soon as government stocks are liquidated.

While the OPS will be struggling with a price control mechanism to apply when a full free market is restored, GSA is expected by June 1 to set a new price pattern with another reduction in its natural rubber selling price. The agency on March 15 announced a 2¢ a pound cut to 48.5¢ and said this price will prevail for all April and May deliveries. The reduction was disappointingly small considering the recent sharp drop in foreign markets, which took place over the weeks preceding the latest price announcement and where GSA bought under strict ceilings. Many expected a price cut of 8¢ to 10¢ a pound; while some thought at least a 5¢-a-pound cut was due. GSA, as recently as two days before its announcement, had been considering dropping its selling price to 44¢, a reduction of 6.5¢ a pound. For these reasons, and with the agency still determined to quit on June 30 without either profit or loss, a substantial reduction is expected to be put into effect for June sales by the government.

The size of the March 15 reduction, GSA explained, was determined after the agency's fiscal division totaled up the books on rubber bought and reportedly advised that any greater reduction than 2¢ a pound for the April and May sales would put the operation into the red. Other observers, who have a pretty accurate idea of what GSA's books show, felt that the fiscal division must have employed long division instead of straight arithmetic. The GSA announcement did not note whether the 2¢-a-pound price cut had the approval of the OPS, the normal procedure followed in such matters. OPS officials, although advised of the coming price cut, declined to comment publicly on whether they concurred with the small cut made by the agency. It seems unlikely, that even if the contrary were true, OPS would dissent. The agency is in a difficult position. OPS could not demand, with good grace, that GSA make a heftier cut in the price at which it supplies crude rubber to industry, when at the same time OPS is unable, because of the Capehart amendment to the price control law, to order manufacturers to rollback their product prices to reflect the full savings resulting from a far cheaper natural rubber. To the public such a course would look like a one-way street in favor of the manufacturers. On the other hand, even unwarranted profits on GSA's books ultimately end up in the public treasury.

In discussing the post-June 30 natural rubber pricing pattern with industry and the trade at the March 18 meeting, OPS promised to consider all suggestions and take no action before again consulting with the committee. No further meeting of the committee was announced at that time.

The discussion related to the type of regulation which OPS should consider, other than the General Ceiling Price Regulation (which pegs ceilings to the price level existing in the December, 1950-January, 1951 period.) Some sort of formula regulation may be adopted. It seems unlikely that crude rubber market operations will lend themselves readily to flat dollars-and-cents price ceilings. Also discussed was the desirability of adopting an amendment to Ceiling Price Regulation 31, which governs the margins of importers, or of establishing a special regulation tailored to conform with practices in the rubber importing trade. The timing of such possible action was considered also.

The meeting was conducted by Chester F. Conner, chief of the Rubber Branch. Besides a number of other OPS officials, those attending included George K. Casto, director of the Rubber Division of GSA; Everett G. Holt, assistant to the director of the Rubber Division, NPA; and Herman H. Barger, of the State Department. The members of the Crude National Rubber Industry Advisory Committee are: James F. Adams, Oak Park, Ill.; R. B. Bogardus, Goodyear Tire & Rubber Co., Akron; S. G. French, H. W. French Co., Alan L. Grant, Charles T. Wilson Co., Inc., D. A. Paterson, H. A. Aslett Co., Lawrence B. Proctor, Farr & Co., Robert D. Reilly, Imperial Commodities Corp., Edward C. Schwab, U. S. Rubber, all of New York; J. M. Slattery, Mansfield Tire & Rubber Co., Mansfield, O.; and H. F. Van Valkenburgh, Dunlop Tire & Rubber Corp., Buffalo.

Tire Prices and Decontrol

The National Association of Independent Tire Dealers, Inc., decided on March 4 to join the manufacturing industry's appeal for removal of price controls on tires. The dealers' group, however, had not filed a petition with the OPS by late March.

NAITD took its stand following the filing of a petition on February 26 by the tire advisory committee to OPS. The petition was referred to a special five-man OPS committee established to study decontrol possibilities. The committee was named by former Price Director Michael DiSalle to advise the OPS director on decontrol policy. It has not yet reported.

In passing, it may be noted that the Senate Banking and Currency committee, now considering the President's request for extension of the Defense Production Act beyond this June 30, has before it various proposals to make mandatory the decontrol of prices in certain instances. Most of these proposals would cover tire prices, it is believed.

Meanwhile OPS acted in late February to permit tire manufacturers to apply for price increases under the so-called Capehart regulations. The action, Amendment 4 to Supplementary Regulation 10 of CPR 22, was effective March 3. It applies to certain tires and tubes and to certain molded, extruded, and cut mechanical rubber goods—items covered by SR 10.

The OPS action permits these manufacturers to use SR 17 or 18 under CPR 22 or the agency's General Overriding Regulation 20 in computing adjustments in ceilings allowed by the Capehart amendment. The Capehart formula entitles manufacturers to their pre-Korea prices adjusted to reflect subsequent changes in cost of labor, materials, and overhead up to July 26, 1951. SR 17 prescribes means whereby any manufacturer subject to CPR 22 may apply individually for such relief; while SR 18 prescribes a more simple method for manufacturers whose net sales are not more than $1 million annually. GOR 20 cover manufacturers doing $250,000 or less in annual net sales.

Prior to this latest action manufacturers of tire and tubes, except those sold to private-brand owners, were required to continue using ceilings frozen by the GCPR to the December, 1950-January, 1951 level. This had been required by SR 10. Private-brand tires were covered by a special regulation, CPR 62, and application for Capehart relief was permitted under GOR 20 or GOR 21.

The White Sidewall Ban

The ban on white sidewall tires was lifted March 26 by NPA, the same day the meeting of that agency's Rubber Industry Advisory Committee was held.

On February 29, NPA informed tire manufacturers that the vulcanizing of white rubber strips to new black sidewalls had been construed by the agency's lawyers as a manufacturing process, covered by the M-2 ban on making white sidewalls, and must be discontinued. On March 4 the agency, responding to a query from the OPS, said that the ban does not extend to the various processes being used for applying white paint to a black sidewall.

Adamson United maintains gage uniformity by using TIMKEN® bearings on roll necks

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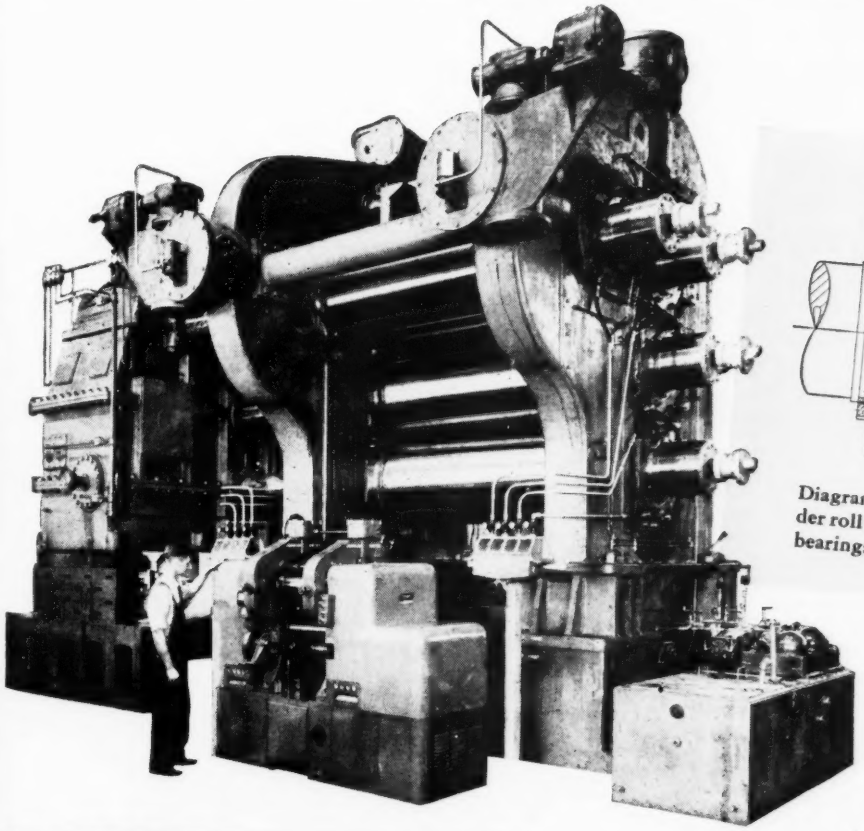

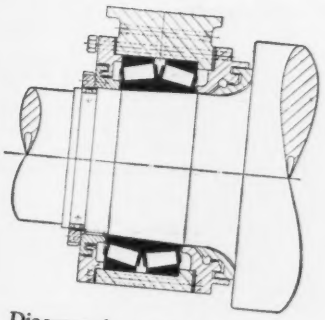

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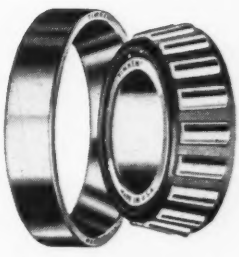

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The practice of vulcanizing white rubber repair strips to a black tire has not been very widespread, officials said. However the various processes of applying white paint to create an ersatz whitewall tire are legion and engaged in by a great many tire dealers, most of them without bothering to apply to OPS for price ceiling approval. OPS has been drawing up a price regulation to impose a uniform ceiling on the service of baking a white rubberized paint on to the surface of a black sidewall tire, but has been holding back this regulation until it has definite word from NPA on how soon the outright revocation of the white sidewall ban may be expected.

Return of the real thing to the market is expected to bring on a quick reduction in the availability of the substitute painting processes, if not their outright disappearance, in either case pretty much eliminating any price control problem for OPS.

Tire Discount Rule

A procession of tire manufacturers and a large group of independent tire dealers filed suits in Federal District Court for the District of Columbia during March seeking both temporary and permanent injunctions to stop FTC from putting into effect an order limiting the quantity discounts granted by manufacturers on sales of replacement tires and tubes.

Between March 3 and 6, suits were filed by 11 manufacturers and 35 dealers, all seeking a temporary injunction to prevent the Commission from putting its proposed discount limit ruling into effect, as scheduled, on April 7, as well as to have the ruling declared invalid. The suits also sought to have the court bar the Commission forever from imposing a limitation on discounts granted on tires by virtue of quantity discounts from manufacturers.

The FTC order, announced in late January, would limit quantity discounts granted by manufacturers to a single, 20,000-pound carload of replacement tires and tubes. Among the manufacturers filing suits, two—Durkee-Atwood, Minneapolis, and Carlisle Corp., Carlisle, Pa.,—manufacture inner tubes, but not tires. In its complaint Durkee-Atwood contended that the imposition of a limitation based on a carload lot of tires and/or tubes would encourage dealers—seeking the maximum discount—to place their business with companies making both tires and tubes, since tubes alone are rarely sold in carload-lot quantities. A company official said it already is facing stiff competition because of discounts offered on full carloads of tires and tubes, but that the FTC ruling would accentuate the tendency of buyers to take advantage of the largest discounts available to them. It feared that this tendency would be so accentuated by the imposition of a discount limit order that Durkee-Atwood would lose its inner tube business. It sells about $600,000 worth of inner tubes a year.

Generally, the manufacturing industry contended in the briefs filed with the Court that the ruling was imposed on inadequate FTC findings of fact, that the small independent tire dealers it is designed to protect are better off economically than ever before, and that the proposed discount limit is against the public interest, since it can result only in higher prices to the public.

The complaints filed by the 35 independent tire dealers, almost all of them from the Chicago area, represented a break in the solid phalanx of independent tire dealers which first proposed a limitation on manufacturer discounts to the Commission several years ago. Significantly, NAITD, which greeted the announcement of the FTC ruling in January with warm praise, declared March 4 that it would stay out of the court battle. It was the NAITD through which the dealers fought for a discount limit in hearings before the FTC in 1950. The Association's board of directors, meeting here March 4, resolved to stay out of the court battle, but went on record in favor of giving the ruling a trial run. If experience indicated that ruling was not working fairly, the Association said, it would appeal to the FTC to have it revised.

The history of the tire discount ruling proceedings sheds much light on the reason for the revolt of some of the dealers (some of the 35 are members of NAITD) and the fence-setting stand adopted by a former vigorous proponent of the ruling, the NAITD. Originally, NAITD and its members sought a limit based not on quantity, but on annual puchase volume. It proposed that the FTC limit discounts to the first $600,000 of replacement tires and tubes bought by a distributer within a calendar year. Such a ruling would leave undisturbed the varying quantity discounts granted to purchasers who buy $600,000 or less of tires during the year.

As the evidence presented to the Commission showed, only a few tire distributers handle a volume exceeding $600,000 annually, and in this group are none of the independents. Instead, these large-volume tire outlets are the major national and regional chains—Sears, Roebuck; Montgomery Ward, etc.—and a few large oil companies who buy for their retail filling station outlets. These were the competitors that NAITD charged had been taking away business from independents, being enabled to do so. NAITD said, because their mass purchasing volume entitled them to substantial discounts unavailable to smaller-volume buyers. It was against their competition—and theirs alone—that NAITD sought relief.

While the FTC findings supporting the issuance of the quantity-limit rule agreed with NAITD, FTC said there are too few distributers in the $600,000 and over bracket to make that limit an effective bar to further competitive damage to small dealers. In other words, the FTC majority said, it could not justify the proposed $600,000 annual volume as a limit under the criteria the Robinson-Patman Act requires it to meet in imposing quantity discount limitations. Commissioner Lowell B Mason, in his lone dissent from the ruling, charged that FTC could not justify even the 20,000-pound carload limit, but employed it only because the supporting data presented by the Commission's staff was based on carload quantity discounts. If the Commission were to act at all, Mason said, it had to act on the data it had before it. Mason, of course, found that the data were inadequate and criticized the Commission majority for allegedly barring the introduction of contrary evidence by some of the manufacturers.

The carload limit ordered by FTC, as the complaining dealers pointed out, would limit the discounts now available to many smaller dealers, along with the major tire outlets which the $600,000 volume limit was specifically tailored to reach. Of the 35 dealers who joined the suit, one did an annual business of $13,000 in tires and tubes; another did $600,000; while for the group, the average was more than $200,000. The complaining dealers told the Court that the proposed carload limit would "seriously impair" their ability to compete and would result in a loss of business to them.

With the filing of the suits, opinion on the carload limit shaped up as follows: Tire manufacturers, almost to a man, contend that it is invalid, unnecessary, and against the public interest. Some of the tire dealers agreed with them to some extent, but generally believed the FTC had prescribed a cure that might kill the patient. The NAITD found itself in the embarrassing position of favoring FTC as the doctor and agreeing with much of its diagnosis, but disagreeing with the proposed cure. In effect, it resolved in favor of maintaining silence on the court dispute and hoped that the Commission would be given another chance. The FTC majority was expected to defend its quantity discount ruling, although perhaps agreeing to a brief postponement of the effective date in order to give all parties an opportunity to prepare their cases for what may be a protracted court fight to test the order. The FTC minority already had made its views known through its sharp dissent in January. At this writing the Court has not scheduled hearings on the complaints or taken any action on the request for a temporary restraining order.

The manufacturers filing individual complaints with the Court included Goodyear, U. S. Rubber, Goodrich, Firestone, General Tire, Pacific Rubber, Denman Rubber, Inland Rubber, Mansfield Tire, Durkee-Atwood, and Carlisle. The 35 dealers joined in a combined complaint.

—A.J.K.

Other Industry News

Tire Outlook Called Good

R. S. Wilson, Goodyear Tire & Rubber Co., vice president in charge of sales, predicted that tire sales should be very good in 1952 for those dealers who make a special effort in that direction.

He pointed to the fact that 73% of the families in the United States now own cars, and the nation's 42 million registered passenger cars represent an increase of about 12 million over those registered at the time of Pearl Harbor.

More over nine million trucks are currently registered in this country, 85% more than there were prior to World War II, he added. For this same period, estimates show a 115% jump in farm tractor registration, another huge source of potential tire business.

The large number of late-model cars on the road which will be needing tires in 1952, the steady increase in the consumption of gasoline, high employment figures, and the rise in consumer income are still additional factors favoring high tire sales in 1952.

Wilson also cited the 1952 forecast for a 34% increase over the 34 million tires sold in 1951, or a total of 45 million tires—the industry's estimate of the replacement passenger tire shipments for the current year.

Labor News

New Union Demands Forthcoming

The international policy committee of the United Rubber Workers, CIO, met in

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Cleveland, O., in mid-March to consider the program of the union for 1952. The meeting of the 200-man policy committee was preceded by a meeting of the general executive board of the union, L. S. Buckmaster, URW president, presided.

Buckmaster claimed that a stepped-up program of anti-union activity by some of the nation's rubber companies will be one of the first problems the union has to face in 1952. Although he refused to name the companies engaged in this campaign, he pointed out that a few of them had engineered "deals with rival unions outside the CIO" in an attempt to lure membership away from the United Rubber Workers union.

Buckmaster laid the bulk of responsibility for the "campaign of harassment" on the Taft-Hartley Law, "with its sinister and weasel-worded gimmicks."

He said these firms engaged in "this plan to break our union" are starting to use the many devices provided in the Taft-Hartley Law to "throw sand in labor-management machinery that has been developing and maturing for 17 years."

Following the policy committee meeting, the URW leaders said they would ask for "equitable" pay raises for their 200,000 members when contracts are reopened this summer. The exact amount of wage increase that would be asked for was not stated. An increase in the $100-a-month pension plan will also be requested.

Other objectives set by the committee for 1952 bargaining include:

1. Adjustment of intra-plant, inter-plant, and area inequities.
2. Completion of the drive for the full union shop and securing of adequate contract provisions to prevent speed-up of operations, rate reductions, and to insure fair and uniform work loads.
3. Improvement of premium pay, night bonus, vacation pay, and other fringe benefits.
4. Improvement of benefits for employes entering the Armed Services.
5. Secure contract clauses providing for the right to reopen wage negotiations at any time upon notice of 30 days or less with the right to cancel the agreement if the wage demand is unsettled.

Goodrich Akron Dispute

A walkout of office workers at the Akron plant of the B. F. Goodrich Co. which began about March 1, resulted in almost complete suspension of production operations at that plant before the end of March.

The office workers, some of whom are members of the local URW union, set up a picket line which from time to time interfered with production workers entering the plant, but of far greater importance was the action of the picket line in preventing trains and trucks from entering the plant to deliver raw materials and take away finished goods.

The company obtained a court injunction to prevent the pickets from interfering with these deliveries and pickups, but the pickets ignored the injunction and also the orders of law enforcement officers and continued to prevent movement of supplies in and out of the plant.

At the end of March the local URW union president and eight other unionists were brought to court to show cause why they should not be punished for contempt to court in connection with the injunction on picketing.

Company officials met with Akron law enforcement officers and demanded that the sheriff and the city police force clear the entrances to the Goodrich plant of pickets so that trains and trucks could come and go, but indicated dissatisfaction with the results of the meeting.

Meanwhile the National Labor Relations Board was called upon to check into the union's charge of unfair labor practice against the company. As soon as this charge is taken care of the NLRB will proceed on the company petition for an election to determine if the local URW union is to be the sole bargaining agent for the Goodrich company Akron office workers.

Strike at Ohio Rubber Ended

One of the longest strikes in the rubber industry ended on February 25 when the URW and Ohio Rubber Co. signed a two-year agreement covering 1,200 workers.

The strike lasted 124 days and ended with a 13¢-an-hour wage increase, 11¢ effective at once, and the remainder retroactive to December 10. The pact was also said to include improvements in holiday pay, union security, grievance and arbitration procedures, and the non-liability provision The company also agreed to permit a union time-study man to check rates in the plant.

The company meanwhile filed a $1,000,000 damage suit against the URW union, charging that it violated a no-strike agreement when it called its members on strike on January 3. The suit alleged that physical violence was used against workers who did not strike, and malicious acts were committted to prevent them from working and to prevent other persons from doing business with the establishment.

EAST

G-E Appointments

Ernest Ohsol, of the chemical division, General Electric Co., Pittsfield, Mass., has been appointed manager of the new product development laboratory. He came to General Electric in February, 1950, as manager of the process development laboratory and previously had been a chemical engineer with Standard Oil Development Co.

Frederick R. Cronmiller, of the chemical division, has been named manager of the division's budgets and procedures section; while Francis A. Pasley has been named to a newly created position of internal auditor.

Mr. Cronmiller, who came with G-E in 1950 as supervisor of budgets and planning, has had broad experience in the field of accounting.

After six years with Bendix Aviation in the payroll department, and then service in the U. S. Army, Mr. Pasley began his career with G-E in 1946 on the business training course. In 1949 he was assigned to special assignments for the chemical division in Pittsfield and the following year was named supervisor of accounting for the laminated and insulating products department at Coshocton, O.

Robert J. Baumann, also of the chemical division, has been appointed sales manager of silicone products, with headquarters at Waterford, N. Y. He was manager of marketing research at Pittsfield since December, 1950, and had started with the chemical division in October 1949, as a market analyst. His previous business connections include Indoil Chemical Co., Sherwin-Williams Co., and American Aniline Products, Inc.

The appointment of four section managers for the silicone products department of the chemical division, also was announced last month. The men and their new positions follow: Robert O. Sauer, manager—engineering; James R. Donnalley, manager—manufacturing; Mark K. Howlett, manager—marketing; and Paul D. Williams, manager—finance. The silicone products department was created in December, 1951, to handle the rapid increase of the G-E silicone business built up in the last five years.

Dr. Sauer began with the company as a research associate in the research laboratory at Schenectady, N. Y., and prior to his present appointment, was a section engineer in the silicone products plant.

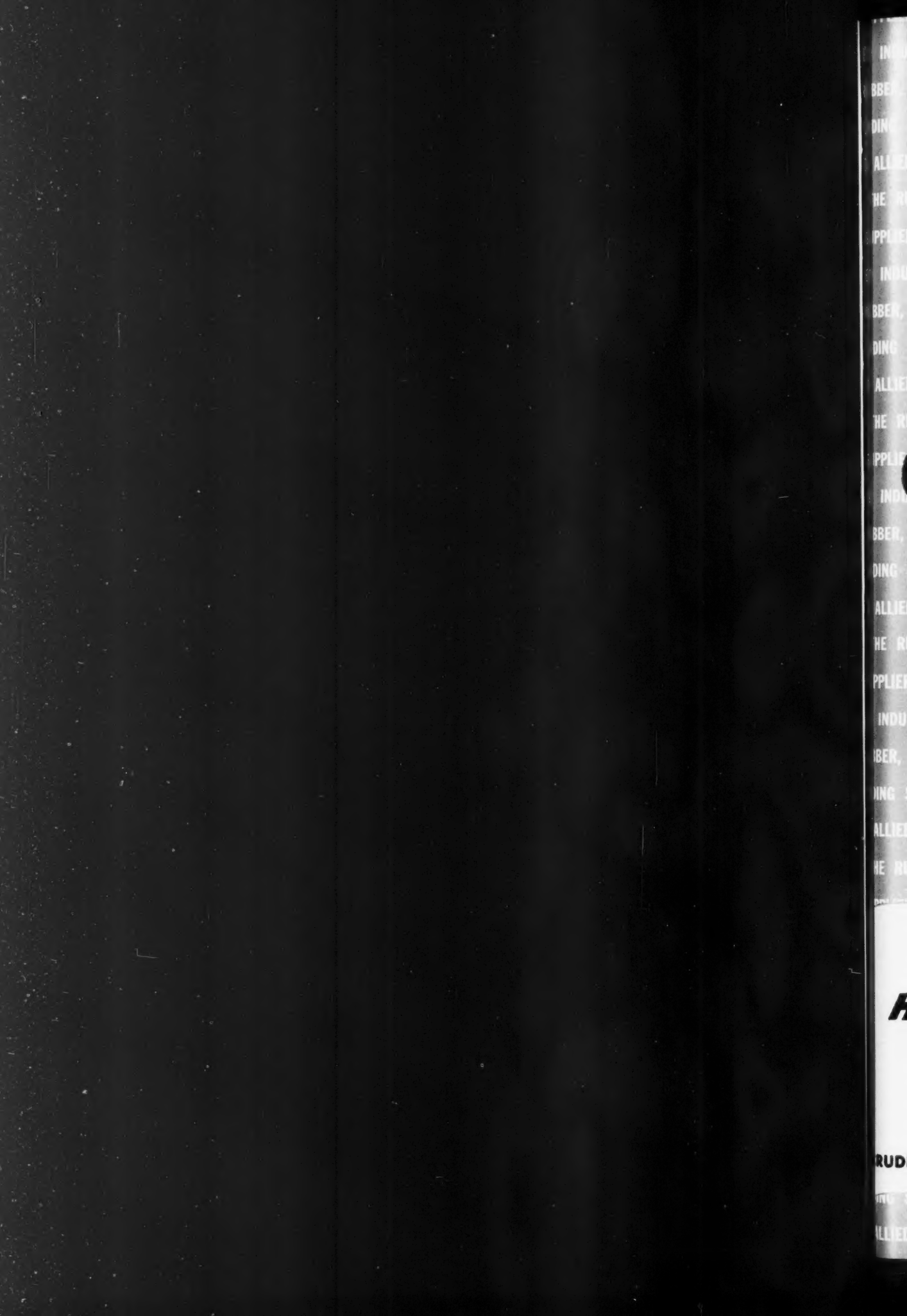
Dr. Donnalley came to G-E in November, 1943, as a research associate in the research laboratory in Schenectady and was employed in the design of the original Waterford plant. In October, 1948, he was made manager of the Waterford plant and two years later, facilities engineer for the silicone manufacturing division.

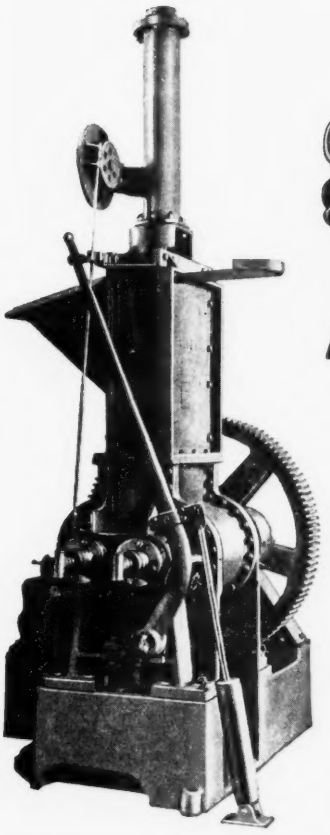
Mr. Howlett prior to coming with General Electric worked for Tennessee Eastman Corp. in Oak Ridge, Tenn. He began with G-E on the test program in Schenectady; worked in the insulation section of the Schenectady Works Laboratory; in 1947 joined the chemical sales training program; became the chemical division's first silicone field salesman, operating in the Chicago district; in October 1949, returned to a position in sales development; and a year later was made field sales supervisor for silicones.

Mr. Williams comes to the chemical division from the management consultation services division in New York where he has been serving as manager of survey services. He started with G-E as an accountant in the Bloomfield, N. J., control department; next was employed as a traveling auditor, operating out of Schenectady; and in 1948 was named administrative assistant to the vice president in charge of affiliated manufacturing companies.

Beta Ray Gage for Fabric

G-E has announced that its beta ray gage has been used to solve the problem of proper quality control on fast-moving sheets of rubber-coated tire fabric at Armstrong Rubber Mfg. Co., Des Moines, Iowa. The impregnated strip of rubberized cord leaving the calender rolls at a speed of thousands of yards a day is continuously and automatically monitored by the gage. The non-contacting device scans the moving sheets with beta rays emitted from a tiny source of Strontium 90, and the amount of rays absorbed by the fabric gives an accurate indication of the material's weight per unit area. A deviation indicator on the instrument allows the calender operator to maintain the fabric at proper gage. While this gage has been used successfully with other strip materials such as paper and steel, the Armstrong installation of the G-E gage is claimed to be the first of its kind in the rubber industry.





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Goodyear Appointments

Important key assignments in research and development activities of The Goodyear Tire & Rubber Co., Akron, O., were reported last month by R. P. Dinsmore, vice president in charge of these phases of the company's operations.

A. J. Gracia, affiliated with the office of the vice president, has been named assistant manager of research and development activities. The post left vacant by Gracia's promotion has been filled by James D. D'Ianni, previously in charge of research studies on synthetic rubbers and vinyl plastics materials.

Gracia's new position, Dr. Dinsmore explained, will bring him in closer touch with all phases of research and development, mechanical goods, manufacturers' contacts, highway transportation, tire and compounding research, chemical products research, chemical products engineering, and chemical equipment engineering.

Other assignments listed by Dr. Dinsmore were those of H. J. Osterhof as director of research, and W. W. Vogt, development manager of the tire and compounding division.

Working under Dr. Osterhof's direction at the company's research laboratory are A. M. Clifford, manager of organic research; J. A. Merrill, manager of engineering research; and H. A. Endres, who is manager of rubber and plastics research.

Gracia joined Goodyear as a staff trainee in 1928, following his graduation from Massachusetts Institute of Technology. Assigned to research activities that same year, he was advanced to chemical engineer and in 1942 to manager of the chemical engineering division. During the war he was in charge of chemical engineering for the company's synthetic rubber operations and next was in charge of the chemical engineering development laboratories, moving to the office of the vice president two years ago.

D'Ianni started with Goodyear in 1938 as a research chemist. In 1946 he was assigned to the Office of Rubber Reserve, Washington, D. C., in charge of the polymer research branch.

Assignment of flooring sales representatives in Philadelphia and Boston have been announced by the films and flooring division. John G. Andrews has assumed duties in Philadelphia, and James Y. Jamison in Boston, both reporting to William J. O'Keefe, eastern district manager of films and flooring sales with headquarters in New York.

Transfer of Robert F. Mosher, flooring sales, from Atlanta to Chicago has been announced by the films and flooring division.

His position at Atlanta has been filled by John H. Hoagland, Jr.

Mr. Mosher has been affiliated with the company as a flooring sales representative since 1949, holding a position at Akron before assuming duties at Atlanta.

Mr. Hoagland is a newcomer to the Goodyear organization, having held prior sales posts with other firms at Cleveland, Charlotte, and New York.

Colley W. Gilchrist, assistant puchasing agent for the St. Marys, O., plant has been transferred to the plant at Luxembourg, where he will assume his new duties as puchasing agent in August, following completion of a 90-day training program at Akron. Gilchrist first joined Goodyear in 1936 at Gadsden, Ala., as a member of the training squadron; was transferred to Atlanta as a sales trainee two years later; in 1941 returned to Gadsden as assistant purchasing agent; was promoted to purchasing agent at Goodyear's plant at Topeka, Kan., in 1945; was sent to St. Marys in November, 1948.

To Erect Warehouse Building on Coast

Plans for construction of a huge warehouse and office building in the new central manufacturing district in Los Angeles, Calif., recently were announced by E. J. Thomas, Goodyear president.

Increased production at the Los Angeles plant is the reason for the expansion.

The modern 309,000 square-foot building, covering 12 acres of a 15-acre tract, will be located at Garfield and Washington boulevards near Vail airport. Efficient and rapid movement of material will be assured by truck facilities on one side of the building and by a railroad spur running along the other side.

Parking space for 100 cars is planned, and the area in the rear of the building provides room for possible future expansion.

Synthetic Rubber Powder for Roads

The development of an entirely new synthetic rubber powder for use in rubber road pavements was announced by Goodyear. Dr. Dinsmore described the new material as a finely divided, free-flowing powder made by the coprecipitation of a butadiene-styrene latex and a mineral filler.

The new material was developed in cooperation with Berry Asphalt Co., Magnolia, Ark. Laboratory and pilot-plant tests indicate the new product to be superior to other rubbers used in road installation with regard to ease of handling and mixing with asphalt. Several tons of the material have already been made in Goodyear's pilot-plant at Akron and many test installations are in progress in the Midwest, with other installations planned this year. The rubber can be made available in two forms, Dr. Dinsmore said: as a coprecipitate with some of the fine mineral aggregate normally used in bituminous concrete, and as a premix with powdered asphalt. Either form is equally effective, it is claimed, and tests indicate that 1.5-2% of the new rubber added to asphalt is equivalent to 5% of conventional rubber-asphalt mixture in resisting the stripping action of water and frost. The new rubber is also said to show considerable promise as a filler in composition siding, shingles, and the like.

Factory Notes

Goodyear tire production recently reached another milestone with the completion of the firm's 550 millionth pneumatic tire for motor vehicles. The record breaking unit, a giant tire for off-the-road construction project use, was presented to Victor Holt, Jr., vice president in charge of tire sales, by Leroy Tomkinson, general superintendent of the company's plants, as it came off the production line.

A new plastics calender designed to produce more than 120 miles of vinyl film over six feet wide in a 24-hour day has been placed in operation by Goodyear in its Akron plant. Designed and built by Adamson United Co., also of Akron, the calender is now producing Goodyear Vinylfilm for use by fabricators of rainwear, drapery materials, shower curtains, garment bags, baby pants, and many other products. Described as the fastest of its type in the world, the calender can produce film up to 20 mils thick. The calender is a four-roll inverted-L type, with each roll 92 inches wide and 32 inches in diameter. The machine is said to possess many design features developed jointly by Adamson and Goodyear Aircraft Corp. engineers to provide accurate gage and superior finish to the film. Accessory equipment includes an electronic metal detector, dual-type embossing equipment; multiple drum cooling unit; and automatic turret type wind-up.

The mechanical goods division conducted a discussion program and training school last month for 43 representatives of 25 industrial rubber goods distributers, to give representatives of firms that handle Goodyear's mechanical goods practical knowledge of the products. The first day was devoted to manufacturing processes, which included an on-the-spot observation of mechanical rubber goods being manufactured. The remainder of the week included talks by department heads of the division and discussions between Goodyear personnel and the industrial rubber goods distributer representatives.

Armstrong Elections

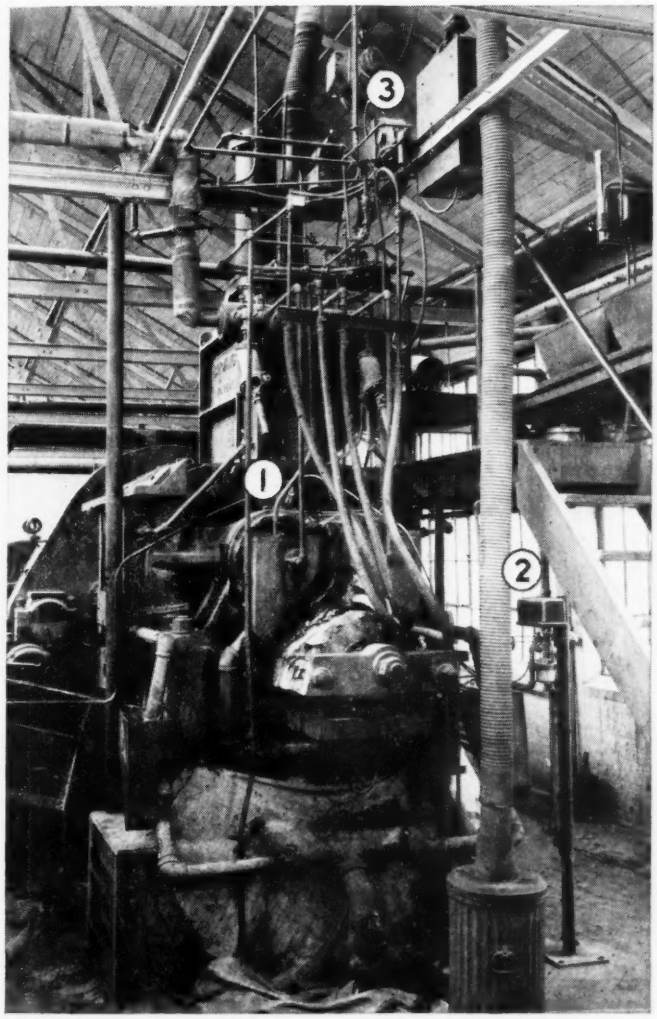
Armstrong Rubber Co., West Haven, Conn., last month announced changes in its board of directors and corporate officers voted at its annual meeting. James A. Walsh, Sr., president, was named chairman of the board; while Frederick Machlin, executive vice president, became president of the company. Other new officers elected were: J. H. Fielding, vice president; E. A. Roberts, vice president in charge of research and development; and Paul L. Giblin, vice president in charge of sales. The following officers were re-elected: C. K. Novotny, vice president in charge of production; F. L. Dwyer, secretary-treasurer; and W. E. Shea, assistant treasurer. S. A. Hardesty was named assistant secretary. The following three new members were added to the board of directors: James A. Walsh, Jr., factory manager of the West Haven plant; Charles E. Rueckert, general manager of the Armstrong-Norwalk Rubber Corp., Norwalk, Conn.; and Albert H. Barclay, Jr., attorney of West Haven.

Mr. Fielding has a record of 25 years in the rubber industry and is well known as a research and compounding engineer. A graduate of Massachusetts Institute of Technology, he is a past chairman of the Division of Rubber Chemistry, A. C. S., chairman of the Copolymer Corp. technical advisory committee; and a member of the editorial advisory board of India RUBBER WORLD.

Mr. Roberts also has 25 years of extensive experience in the tire industry and is an expert in airplane tire design. A graduate of Ohio Wesleyan, he won a Presidential Civilian Citation for his wartime work in airplane tire design as a consulting engineer in the establishment of USAAF airplane tire plants in Europe and Africa.

Mr. Giblin has been with Armstrong for 19 years following his graduation from Tufts College. He worked in both the accounting and the sales departments and was sales manager until his present appointment.

How hot is the mix in your Banbury?



Taylor has licked the problem of giving fast, accurate temperature measurements of the tough mix inside your Banbury Mixer. Taylor's TRANSAIRE* Temperature Transmitter practically eliminates time lag in the difficult measurement problem, and is so fast and so precise that it gives an accurate record of both the *temperature and time* of every batch.

This is the fastest temperature measuring system yet satisfactorily applied to Banbury mixers. Its exceptionally quick response is due to a new derivative action, SPEED-ACT*, in the measuring system of the TRANSAIRE force-balance temperature transmitter.

The Cincinnati Rubber Mfg. Company, makers of mechanical rubber goods, has installed the new system on the Banbury shown at left. They are getting records of each batch in the Banbury that are most accurate and an improvement over results previously obtained. Ask your Taylor Field Engineer how you can do the same! Taylor Instrument Companies, Rochester, New York and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

*Trade-mark

HERE'S HOW IT WORKS: The tiny temperature-sensitive bulb is installed through the wall of the mixer at point 1, about 1½" into the mix just above the rolls. Impulses from the bulb are converted to output air pressure by the Transaire Transmitter at point 2, and relayed to a recorder mounted by the catwalk at point 3. Recorder makes a permanent record of true temperature and *actual time* of each batch.

Taylor Instruments
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ACCURACY FIRST
IN HOME AND INDUSTRY

now *in expanded production*

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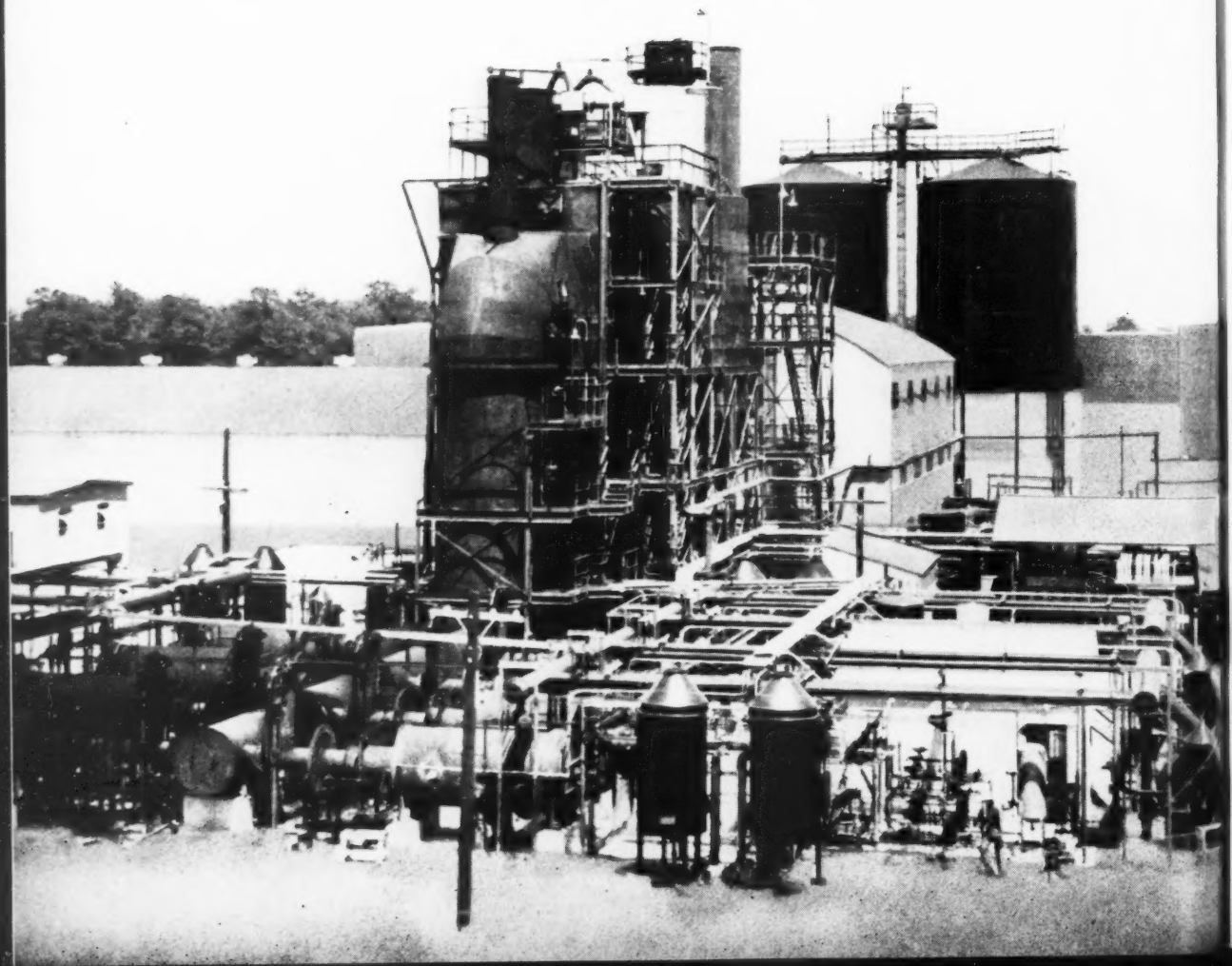

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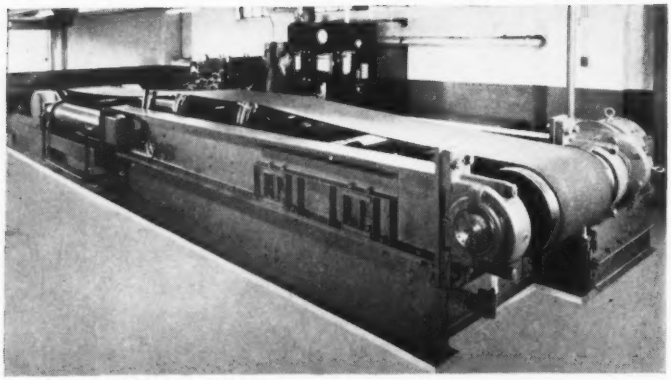

Raybestos-Manhattan's New Laboratory Testing Machine for Conveyer Belting up to 30 Inches Wide

Lab Belting Tester

Raybestos-Manhattan, Inc., Passaic, N. J., has announced the operation in its laboratory of a conveyer-belt testing machine said to be the largest laboratory machine of its type in the world. Designed by the company's engineers, the machine differs from conventional laboratory models in that it can handle production-size belts up to 30 inches wide. The machine tests an 80-foot length of conveyer belt under a total tension of up to 200,000 pounds, while duplicating actual conveyer arrangement of head, snub, bend, take-up, and tail pulleys. Automatic recorders simultaneously chart power input, stretch, tension, and speed at any belt speed up to 2,000 feet a minute. Some of the important factors in conveyer belt design being investigated on the new machine include the relation between belt tension load and pulley size, belt strength, and factor of safety; relation between belt stretch and tension; relation between tension and belt thickness, troughability, and load sag between idlers; relative life expectancies of different types of vulcanized splices and mechanical fasteners; and relation between belt tension and non-flexing pull strength. Besides supplying basic data, the testing machine is expected to relieve both the manufacturer and the purchaser from much of the trial and error involved in the design of conveyer belts of unusual requirements.

Copolymer Corp. Changes

Ralph T. LaPorte, chief chemist of Seiberling Rubber Co., Akron, O., has been elected chairman of the technical advisory committee of Copolymer Corp. which produces butadiene and synthetic rubber at Baton Rouge, La. Copolymer is operated jointly by eight companies, including Seiberling. Mr. LaPorte succeeds J. H. Fielding, Armstrong Rubber Co., West Haven, Conn., who has completed two years as chairman of the committee. Other committee members follow: R. E. Rude, Armstrong Rubber Mfg. Co., Des Moines, Iowa; Vaughn Wheeler, Armstrong Rubber Co., Natchez, Miss.; Mr. Fielding; J. P. McKenzie, Copolymer Corp.; Joseph Rockoff, Dayton Rubber Co., Dayton, O.; K. G. Custer, Gates Rubber Co., Denver, Colo.; W. B. Dunlap, Lee Rubber & Tire Corp., Conshohocken, Pa.; R. M. Gage, Mansfield Tire & Rubber Co., Mansfield, O.; and William Pyle, Sears, Roebuck & Co., Chicago, Ill.

Toy Fair Sets Records

The largest American Toy Fair in the history of the show, comprising the exhibits of approximately 1,200 companies, was held on March 10-19 in New York, N. Y. The show covered more than eight floors in the Hotel McAlpin, seven floors in the Hotel New Yorker, and permanent showrooms at 200 Fifth Ave., 1107 Broadway, and other locations. While restricted to the trade, registration was estimated at 11,500 persons and exceeded the 1951 Fair total of 10,000. Business transacted at the show was also at record levels, with many exhibitors reporting new sales peaks.

As in previous years, rubber and plastic items were very much in evidence throughout the exhibits, and excellent business was reported in dolls, vinyl inflatables, rubber masks, balls and puppets. Rubber masks in a bewildering array of styles were shown by Austin Art Studios; Bayshore Industries, Inc.; as Dessart Brothers, Inc.; Long Island Mask Co., Inc.; Topstone Rubber Toy Co., Inc.; and United Mask & Novelty Co. Displays of balloons were shown by Lee-Tex Rubber Products Corp. of California; Marshall Rubber Co.; Oak Rubber Co.; Pioneer Rubber Co.; Schiller Co.; and Van Dam Rubber Co., Inc.

Other rubber toy exhibits include those of Aktoy Mfg. Co. (crib toys); Auburn Rubber Corp. (toys, cars, farm sets); Barr Rubber Products Co. (balls, crib toys, balloons); Ben-Her Industries (toys); Blake-Cutler Corp. (crib toys); Dewey & Almy Chemical Co. (Da-Glo playballs, Duraduck rubber duck decoys, latex doll parts, and a new line of gun recoil pads); Eagle Rubber Co., Inc. (new playballs, inflated softball, and trick baseballs); Eastern Rubber Specialties Co. (crib toys and dolls); Fli-Back Sales Corp. (fly-back paddle balls); Frost Toy Co. (rubber stamp sets); Model-Craft, Inc. (molding sets); Molded Latex Products, Inc. (new rubber and plastic doll parts and new inflated playballs with self-sealing valves); National Playthings (crib toys); Seamless Rubber Co. (balls and new lightweight swim caps); Seiberling Latex Products Co. (dolls, balls, and new cork center baseballs, sponge balls, and play balls); South Shore Rubber Co. (crib toys); Sun Rubber Co. (dolls, toys, balls); Superior Rubber Industries (rubber horseshoe sets); and Tillotson Rubber Co., Inc. (balls, balloons, crib toys).

Vinyl inflatables, including beach balls, wading pools, beach mattresses, and play balls, were shown by Alvimar Mfg. Co., Inc.; Bilnor Corp.; Clarvan Corp.; Doughboy Industries; Kestral Corp.; Plastic Heat Sealing Co.; Plastic Innovations, Inc.; Plastictronics, Inc.; Plastikaire Products, Inc.; U. S. Fiber & Plastics Corp.; Urb Plastics Corp.; and Vanguard Corp. Among the larger exhibitors of plastic molded toys were Banner Plastics Corp.; Dillon-Beck Mfg. Co.; Empire Plastics Corp.; Gotham Industries, Inc.; Premier Plastics Co.; Renwal Mfg. Co., Inc.; and Thomas Mfg. Corp.

Scrap Institute Meets

The Scrap Rubber Institute, National Association of Waste Material Dealers, Inc., met March 17 at the Waldorf-Astoria Hotel, New York, N. Y., as part of the Association's thirty-ninth annual convention on March 17-19. In addition to meetings of the seven commodity divisions, the convention included luncheon and banquet meetings, a press luncheon on March 18, and a special ladies' program.

President Henry M. Rose, H. Muehlstein & Co., Inc., presided over the Institute meeting, which was attended by some 36 members and guests. Mr. Rose read a copy of a letter from F. E. Traflet, Pequanoc Rubber Co. and president of the Rubber Reclaimers Association, Inc., to NPA expressing the opposition of the Association to the clauses in rubber order M-2 discouraging the use of reclaim in favor of GR-S. The Institute voted to endorse the reclaimers' protest, and a committee will be appointed to take suitable action.

A. Lowenstein, A. Lowenstein Co., reporting for the nominating committee, recommended the reelection of the Institute's current officers. Reelected unanimously were Mr. Rose as president; Roger Ottignon, Nat E. Berzen, Inc., as vice president; and Ben Gordon, A. Schulman, Inc., as secretary-treasurer. L. N. Larsen, Muehlstein, reported on activities of the traffic committee toward securing lower freight rates for scrap rubber.

A feature of the meeting was a general forum on OPS ceiling prices and policies for scrap rubber, with questions answered by three representatives from the tire price section, rubber branch, rubber chemicals division: H. H. Peterson, section chief; Harry R. Hinkes, division counsel; and William Miller, business analyst for the division. The OPS speakers stressed the need of advice and cooperation from the scrap rubber industry in determining future pricing policies. It was emphasized that present ceiling prices for scrap rubber are not restrictive, but are really stand-by prices. Future prospects for controls depend on world conditions, but the present thinking is toward suspending controls instead of removing them.

The Aetna-Standard Engineering Co., Pittsburgh, Pa., has appointed W. J. Langacher chief engineer and G. E. Mandry assistant chief engineer of the pipe and tube division. Mr. Langacher, who succeeds Perry J. Snyder, resigned, has been with the company many years and has held several engineering positions covering Aetna's major product lines of pipe and tube, flat-rolled and drawbenches. Mandry has also seen long-time service with the company, most recently as project engineer.

You can't meet competition or stop Stalin by pitching raw materials and manpower into the scrap bin.

And if you don't know how to eliminate scrap ask Moe Muscles or any other pressman who has worked with our silicone release agents.

They'll tell you how much easier it is to unload deep cavity molds and complicated shapes. That eliminates torn heats. And because only a very light application is required to give easy release, you can check off non-knits, fold-overs and loose tuck-unders too.

They'll tell you how much our silicone lubricants improve flow—even in heavily loaded stocks. That puts an end to non-fill rejects.

By keeping molds cleaner longer, our silicone release agents also help to maintain close tolerances; keep white and light colored stocks clean; assure uniformly high surface finish and sharp detail.

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For Easier Release and Better Quality
SPECIFY
DOW CORNING SILICONE MOLD RELEASE AGENTS
EMULSIONS for molds and curing bags; MOLD RELEASE FLUID in solvent solution for green carcass, bead and parting line release.

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New Rubber Brokerage

Internatio-Rotterdam, Inc., 52 Broadway, New York, N. Y., for many years shippers' agent for crude rubber has announced a change in status to that of dealer and importer, effective April 1. The large scope of the parent company in Holland, the N.V. Internationale Credieten-Handelsvereeniging Rotterdam", and the subsidiary offices throughout the rubber producing areas of the Far East (20 offices in Indonesia, three in Malaya, and one in Siam) assure the most comprehensive coverage of the market from the aspects of both producing and trading. The Far Eastern branches include many company owned or managed estates as well as packing plants at the important shipping centers for native rubber. These plants are the sources of the R.T.C.- and I.C.H.V.R.-mark grades that are well known in the trade. Cornelis Hagers, produce manager of the New York office, will be in charge of trading here. With 12 years of experience in the Far East, including organizing the packing plant in Pontianak, Borneo, Mr. Hagers brings to his position an intimate knowledge of all aspects of rubber marketing.

The Bagley & Sewall Co., Watertown, N. Y., last month announced the resignation, effective April 15, of Joseph S. Scheuermann as vice president and of Thomas N. Carter as director of engineering, winder division, effective March 1. Mr. Scheuermann was in charge of the entire winder project and was headquartered in New York, N. Y.; while Mr. Carter was stationed in Watertown. E. Peterson also resigned March 1.

Freeport Sulphur Co., New York, N. Y., is spending approximately $20,600,000 on new projects to increase the nation's supply of essential sulfur. As part of a long-range program to bolster reserves and broaden its earnings base for the future, the company has obtained rights on government lands near Carlsbad, N. M., as a potential source of potash, and on lands containing sulfur-bearing ores, including 7,800 acres in Carroll County, Va. The company estimated that the annual output of sulfur in the United States by the end of 1953 may be increased by 1,200,000 long tons of brimstone and about 500,000 long tons of sulfur in various forms from other sources; while 1,300,000 tons more a year may be realized from projects in other countries.

E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., plans construction of a new $2,000,000 Haskell Laboratory of Industrial Toxicology near Newark, Del. Scheduled for completion in about a year, the new laboratory will be a single-story, air-conditioned brick building providing 33,000 square feet of space. The new construction will provide enlarged facilities for the company's industrial toxicology department, at the du Pont Experimental Station since 1935. The Haskell Laboratory rigidly tests du Pont products and manufacturing processes to eliminate any potential hazard to employes and customers and also conducts research on causes of fatigue among employes and the physiological reactions to chemical compounds.

For Highway Modernization

Executives of more than 40 national organizations, representing millions of traffic-concerned Americans, met in New York, N. Y., February 28, to launch "the first nationwide good-roads movement in more than a quarter of a century."

The transportation leaders came together from various parts of the country at the request of Albert Bradley, chairman of the National Highway Users Conference. In his letter of invitation Mr. Bradley referred to the meeting as a means to "avert a possible highway crisis."

Immediate purpose of the meeting, held at the University Club, was to form a committee to be known as the Project-Adequate Roads Committee, or the National PAR Committee. Included are representatives of farm and industry groups, motor clubs, truck and bus owners, and road construction, automotive, petroleum, and rubber industries.

A primary concern of the new organization will be to urge defense officials to place highways nearer the top of their priority lists so that sufficient materials will be allocated to correct serious road and street deficiencies in the interests of national security. The PAR Committee's other objective is of long-range character. It will be to stimulate continuing activity in highway improvement so as to "put the nation's highway on a PAR with the nation's needs."

Acting as the organization's temporary operating committee will be Paul B. Reinhold, president of the American Road Builders Association; L. S. Wescoat, president of Pure Oil Co. and chairman of the board of the American Petroleum Institute; Mr. Bradley, also vice president of General Motors; and, in an ex-officio capacity, Arthur M. Hill, chairman of the executive committee of the Greyhound Corp. and president of the National Association of Motor Bus Operators. Mr. Hill will serve as temporary chairman of the PAR organization until its next meeting, to be held in conjunction with the Fourth Highway Transportation Congress, convening in Washington, D. C., May 6-8. Arthur C. Butler, director of the National Highway Users Conference, was elected permanent secretary of the national PAR organization.

For its long-range concern of stimulating continuing road programs in all states, the national PAR committee will look to the Sufficiency Rating system. Sufficiency Ratings are becoming widely accepted by public officials, and others, as the mechanism for determining accurately relative road needs, as a means of establishing priorities and as a basis for programming.

Emery Industries, Inc., Carew Tower, Cincinnati 2, O., has announced the winner of the contest it sponsored at the recent Chemical Industries Exposition in New York, N. Y., as being Philip C. Moreau, Corn Products Sales Co. The contest involved the naming of the Emery ball-man trade mark currently being used by the company, and the winner was selected by Emery's advertising agency, Ruthrauff & Ryan, on the basis of originality and connection with Emery products. The prize, a leather two-suiter luggage displayed at the Exposition, was presented to Mr. Moreau by H. D. Armitage, Emery's New York district manager.

1951 Good Year for F-B

The 1951 annual report to stockholders of Farrel-Birmingham Co., Inc., Ansonia, Conn., and its wholly owned subsidiary, Consolidated Machine Tool Corp., Rochester, N. Y., show combined net sales of $33,770,681. Farrel-Birmingham, with net sales of $25,498,754, recorded a 48% increase over 1950 figures, and the company had a near-record year of bookings approximating $50,000,000.

Incompleted work in the three F-B plants at Ansonia and Derby, Conn., and Buffalo, N. Y., totaled $40,000,000 at the year's end, which, with $11,000,000 in unfilled orders at Consolidated, gave parent and subsidiary companies a total backlog of $51,000,000 as of December 31, 1951.

Earnings per share of Farrel-Birmingham stock at the close of the year amounted to $4.36 for Farrel-Birmingham and $1.60 for Consolidated.

It was reported that Arthur H. Ingle, president of Consolidated, was elected to the Farrel-Birmingham board of directors in January, 1952, and that George A. Goss, Jr., had been elected to the board in March, 1951.

Gro-Cord Rubber Co., Lima, O., held its thirty-third annual meeting on February 25 and reelected the following directors: F. W. Cook, Rodney P. Lien, Melvin C. Light, Forest Moor, and Harold Smith. Also named to the board was Virgil M. Knisely. At the directors' meeting the following officers were reelected: president, Mr. Cook; vice president and general manager, Mr. Moor; vice president and sales manager, J. S. McKindsey; vice president and assistant treasurer, Mr. Smith; secretary-treasurer, W. L. Hunt; assistant secetary, Mr. Light.

Stein, Hall & Co., Inc., New York, N. Y., at its annual board meeting elected Robert Strasser executive vice president and Joseph C. Blauvelt, Sadie Feldman, and Daniel H. Lipman vice presidents, and Ernest Rusch assistant vice president. Lawrence Gussman, vice president in charge of manufacturing and technical research, was elected president of The Stein-Davies Co., a manufacturing subsidiary of Stein, Hall in Long Island City. S. Crawford Bonow was named assistant vice president, and Frank G. Fackler plant superintendent of Stein-Davies.

Ball Bros. Co., Inc., Muncie, Ind., on March 20 added three new members to its board to increase the directorate to 11 men. The new directors are: John P. Collett, president of Collett & Co., investment banking counsellor; Robert W. Biggs, Ball vice president and glass manufacturing manager; and James L. Knipe, vice president and general sales manager of the company's commercial glass and consumer products divisions.

Whittaker, Clark & Daniels, Inc., distributer of minerals, colors, and pigments, 260 West Broadway, New York, N. Y., has appointed Elmer G. Stillwagon manager of the export department, with which he has been associated four years. He succeeds Louis Storch, now the firm's import manager. Although Whittaker's sales are world wide, its principal export market is Latin America.

Retard flex cracking and oxidation

Whether your products are made of natural, synthetic or reclaimed rubber, you can retard oxidation and flex cracking by the use of Monsanto Antioxidants. These proved-in-service chemicals are available for immediate delivery.

Santoflex* **B, Santoflex BX** and **Santoflex 35** retard flex cracking and oxidation.

Santowhite* Crystals, Santowhite MK and **Santowhite L** are nonstaining antioxidants for light-colored products.

Flectol* H retards oxidation and heat deterioration in compounds that do not require exceptional resistance to flex cracking.

Antioxidants are among some two score chemicals Monsanto produces especially for the Rubber Industry. For information on chemicals for rubber, get in touch with MONSANTO CHEMICAL COMPANY, Rubber Chemicals Sales, 920 Brown St., Akron 11, Ohio.

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Holds Annual Meeting

Dewey & Almy Chemical Co., Cambridge 40, Mass., held its annual stockholders' meeting on March 17. Alexander T. Daignault, company treasurer, and Bradley Dewey, Jr., vice president in charge of the Cryovac division, were elected directors of the firm. President Bradley Dewey noted that first-quarter sales were far below expectations owing to high customer inventories. The reduced sales coupled with higher than anticipated costs of starting up new facilities at the Acton plant resulted in a first-quarter loss. Mr. Dewey emphasized, however, that the company's long-range prospects are sound, although present depressed business conditions may result in a reduction or deferment of the June dividend.

Mr. Daignault, treasurer of the company since 1948, joined Dewey & Almy in 1946 as assistant to the president after previous experience with United States Rubber Co. and the Office of the Quartermaster General. Elected vice president in charge of the Cryovac division in 1951, Mr. Dewey, Jr., joined the firm in 1940 as a division head in the research laboratory and later headed the development department.

Election of T. T. Miller as vice president—marketing, and George W. Blackwood as vice president—general sales manager, by the board was announced March 25.

Mr. Miller, vice president—sales for several years, will devote most of his time to developing and expanding the company's position in the organic chemicals field. Recent expansion of facilities at the Acton, Mass., plant, in addition to those at Cambridge, will greatly increase the annual capacity for production of synthetic resins, rubbers and latices, monomers, plasticizers, phthalic acid, and dispersing agents. Mr. Miller also will continue to direct sales activities of the shoe and printing products divisions of the company as well as marketing research.

Mr. Blackwood, who managed the company's rubber specialties division before being named general sales manager two years ago, will be responsible for sales of the company's container products, adhesives and coatings, construction specialties and soda lime divisions in addition to supervising the rubber specialties division.

Adds to Staff

Two engineers have been added to the staff at the Acton plant—one in the polymer division, and one in the plasticizer plant.

Harold W. Flood has been assigned to the new plasticizer plant where he will assist in getting production underway. O. Benjamin Hander has been assigned to the polymer plant to handle special production problems.

Mr. Hander was previously chemical engineer at Humble Oil & Refining Co., Baytown, Tex. From 1948 to 1951 he was loaned by Humble to the RFC, where he was manager of production control of synthetic rubber in the Office of Rubber Reserve.

Mr. Flood was previously employed by Mutual Chemical Co. and Freeport Sulphur Co.

A. J. Schneider has been appointed manager of the shoe products division. Mr. Schneider, head of Midwest sales with headquarters in Dewey & Almy's Chicago office, has taken over his new duties from Henry J. Spelman, assigned to the investigation of a new profit opportunity for the company.

It was also announced that Mr. Spelman will continue to represent the company on the task group working with NPA on the problems of rubber products for leather shoe manufacturers.

Joseph M. Schmidt has joined the company's rubber specialties division to assist in sales of meteorological balloons and the division's new guaranteed unbreakable rubber dollskin to the doll industry. Mr. Schmidt was formerly sales manager of Plastic Welding Corp.

Wins Safety Award

Firestone Tire & Rubber Co., Akron, O., will be given the Award of Honor of the National Safety Council for 1951 on a company-wide basis. This will mark the sixth time in seven years that the company has been given the Council's highest award for industrial safety. The accident record for the Firestone plants in 1951 was the lowest ever attained. The frequency rate was only 2.0 lost-time accidents per million man-hours worked, well below the 7.1 national frequency average for the rubber industry. The Firestone severity rate, or average number of days lost because of accidents, was 0.29 per thousand man-hours worked. The company's 1951 record represents an improvement of 0.2 in frequency rate and 0.12 in severity over the previous year's record. Three Firestone plants completed the year of 1951 with no accidents whatsoever, as follows: the Xylos plant at Memphis, Tenn.; the plastics division plant at Pottstown, Pa.; and the Lake Charles, La., plant.

100% Cold Rubber Plant

The government synthetic plant operated by Firestone at Lake Charles, La., is the first of its kind to be placed in 100% production of cold rubber under the program to convert 75% of the total synthetic rubber output in this country to cold rubber, according to Raymond C. Firestone, company vice president. In 1951 the Lake Charles plant had already converted 42 reactors to cold rubber and has now converted all of its 54 reactors to this process. Plant capacity is now 7,500 tons a month, and the plant has manufactured more than one billion pounds of rubber to date.

Cole Advanced

Otis D. Cole has been named to the administrative staff of the research division. He formerly was assistant director of the chemical and physical research laboratories. Recipient of a Firestone fellowship, Dr. Cole came to Akron in 1928 to study rubber chemistry at the University of Akron, where he received a M.S. degree. He then went to Iowa State College for further study and received a Ph.D. degree in plant chemistry in 1931. He became permanently associated with Firestone in 1931 and since then has been in research work for the company in Akron, except for two periods of six months and 14 months which he spent in Liberia on special assignments for Firestone Plantations Co. President-elect of the Ohio Chapter of the American Institute of Chemists, Dr. Cole also is a member of the American Chemical Society and Alpha Chi Sigma.

Names Naugahyde Licensees

United States Rubber Co., Rockefeller Center, New York 20, N. Y., has licensed four major manufacturers of vinyl coated fabrics to manufacture and sell Elastic Naugahyde, the company's stretchy vinyl plastic upholstery made with knitted fabric backing. The four licensees are Masland Duraleather Co., Philadelphia, Pa., maker of Duran; Federal Leather Co., Belleville, N. J., maker of Federan; Landers Corp., Toledo, O., maker of Versilan; and Textileather Corp., Toledo, O., maker of Tolex. The licenses were issued because of the rapidly increasing demand for this upholstery, introduced to the market in 1950 and now being adopted as seating upholstery by the automotive and furniture industries. The plastic is made in the rubber company's Mishawaka, Ind., plant.

Offers New Auto Tire

A new popular priced, conventional pressure auto tire, the U. S. Centipede Grip, has been announced by the tire division. According to A. W. Bull, of the division's tire development department, the new product gives owners of pre-1948 cars a tire that offers skid and traction features hitherto unavailable at popular prices. The tire's continuous seven-row tread is deskidded for greater traction and quicker stopping. The special shoulder design makes for cooler running by dissipating heat, thereby giving longer mileage. Road tests also indicate that the tread design offers greater steering ease and a smooth, silent ride. The new tire comes in 6.00-16, 6.50-16, and 6.50-15 sizes.

Personnel Notes

Harry M. Frecker, now manager of commodity sales for the mechanical goods division, will have direct charge of all commodity sales departments for such mechanical rubber goods as conveyor and elevator belting, V-belts, flat transmission belts, printing rolls and blankets, tank lining and roll coverings, hose, packing, plastic products, molded rubber specialties, tape, industrial rubber mountings and matting. Mr. Frecker has had broad experience in product development, manufacturing, and customer contact. He joined U. S. Rubber in 1922 as a technician in the development department of the Passaic, N. J., plant and has specialized in mechanical rubber goods throughout his career. He most recently was development manager at Passaic.

Wm. M. Dougherty, secretary of U. S. Rubber, last month was elected secretary of American Society of Corporate Secretaries, Inc.

Plastex Products Co., 312 Dobbs St., Marietta, Ga., has been formed to manufacture products from natural and synthetic latices and vinyl plastisols. The new company will specialize in the development and producton of compounds for specific processes or products. Plant facilities are designed for complete flexibility in handling small custom orders or contract volume manufacture of finished or semi-finished goods by molding, dipping, slush molding, spraying, or other techniques. President of the firm is R. T. Henson, formerly with American Anode, Inc., most recently as manager of the service and control laboratories. Clyde Wilkins, Jr., is vice president and sales manager of Plastex and was formerly associated with the knitted hosiery industry.

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BRT 3 Rubber Reclaiming Tar*
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To Build in Brazil

Plans to build a $5 million tire factory in Brazil capable of producing 200,000 tires and tubes a year last month were announced by William O. O'Neil, president of The General Tire & Rubber Co., Akron, O., upon his return home from Rio de Janeiro.

In announcing his company's expansion in South America, Mr. O'Neil said the plant would be capitalized according to the company's policy of financing foreign operations with local capital.

Site of the new factory will be about 20 miles from Rio on a new highway to Sao Paulo. Construction will begin immediately, with production slated to get under way in about a year.

In addition, plans also call for the construction of a large and modern residential area for the employes.

Mr. O'Neil was accompanied on his trip to Rio by C. O. Perkins, who has represented General Tire in South America for 22 years. Michael O'Neil, executive assistant to the president, joined his father in an inspection of General Tire's factory in Caracas, Venezuela.

Stockholders Approve Split, Reelect Board

Shareholders of General Tire have approved a split of the common stock on a 2-for-1 basis and also reelected all 14 directors.

The stock split, presented to the shareholders after the January directors' meeting, increases the authorized shares of common to 1,500,000 and reduces the par value from $5 to $2.50 a share. General now has 1,206,528 outstanding shares of common stock.

Directors reelected were: W. O. Neil, L. A. McQueen, W. E. Fouse, S. S. Poor, Robert Iredell, C. J. Jahant, M. G. O'Neil, H. R. Jenkins, T. F. O'Neil, J. F. Creamer, L. L. Strauss, B. E. Smith, C. F. O'Neil, and E. W. Ross.

At the board's annual meeting W. O'Neil was renamed chairman and president. Other officers elected were: M. G. O'Neil, executive assistant to the president; McQueen, C. F. and T. F. O'Neil, and Jahant, vice presidents; T. S. Clark, treasurer; F. W. Knowlton, secretary; and James Little, assistant treasurer

Howard A. Bellows, manager of retail merchandising, was elevated to the post of vice president and will report to Mr. McQueen, vice president in charge of sales.

William O'Neil Honored

William O. O'Neil, General president, was guest of honor at a dinner held March 18 at the Hotel Pierre, New York, N. Y., by the Paints, Chemicals, Rubber, and Allied Industries Division of the State of Israel Bond Campaign. According to the dinner chairman, Martin I. Cowen, Consolidated Products Co., Inc., Mr. O'Neil was honored for his part in the establishment of a General tire plant in Israel which has given impetus to Israel's economic independence program by encouraging other American firms to establish branches there.

Harrington Elected

R. H. Harrington, advertising manager at General Tire, last month was elected vice president of Traffic Audit Bureau, Inc.

Eagle-Picher Elections

At the annual shareholders' meeting of The Eagle-Picher Co., March 25, at company headquarters, 1100 American Bldg., Cincinnati 1, O., Wm. R. Dice was elected a director to succeed the late Vincent H. Beckman. Mr. Dice has been with the company since 1928.

Reelected directors for the coming year are Joel M. Bowlby, Carl A. Geist, Carl F. Hertenstein, Elmer Isern, Stanley R. Miller, Wm. H. Mitchell, John J. Rowe, T. Spencer Shore, George A. Spiva, and Miles M. Zoller.

All officers of the company were reelected as follows: Mr. Bowlby, chairman of the board; Mr. Shore, president; Mr. Dice, vice president and comptroller; Mr. Geist, vice president, secretary, and treasurer; Mr. Isern and Mr. Zoller, vice presidents; and Richard Serviss and K. E. Kimmel, assistant secretaries.

Stockholders approved an increase in the presently authorized common shares of the company from 1,000,000 to 1,500,000 shares of a par value of $10 a share.

To Open Plant in Georgia

General Latex & Chemical Corp., Cambridge, Mass., will open a southern plant in Dalton, Ga., in June. This new plant will contain the most modern latex compounding and processing equipment as well as its own research and development laboratory and testing laboratory. Robert H. Elwell has been named general manager of the new plant.

General Latex operates manufacturing facilities in Cambridge and in Montreal, P. Q., Canada. Bulk latex receiving facilities are maintained at piers in Boston, Mass., Baltimore, Md., and Montreal. Sales representatives are stationed in Cambridge, New York, N. Y., Philadelphia, Pa., Charlotte, N. C., Akron O., Chicago, Ill., Buffalo, N. Y., Montreal and Toronto Ont., Canada.

General Latex is the exclusive agent for the important and sale in the United States of H & C (Malaya), Ltd. quality latex. Harrisons & Crosfield, with 46 offices in 12 countries, is one of the largest and most diversified of the latter-day merhalf million acres of Far East plantations chant adventurers. The firm manages oneand was a pioneer in the establishment of the rubber industry in Malaya.

General Latex is also closely associated with the synthetic rubber industry. From 1942 to date, General Latex has been a co-operator of a government owned GR-S plant. General Latex is now operating in conjunction with Goodyear Tire & Rubber Co., and Mohawk Rubber Co., a GR-S plant in Akron.

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O., in its recent annual report to stockholders declared that it is currently embarked upon a major program of expansion, diversification, and modernization which will take at least two years to bring to successful completion and is designed to extend its activities in the organic field. Included among other projects are extensions of facilities for the production of chlorine-based plastics, solvents, other petrochemicals and insecticides together with the necessary supporting chlorine producing facilities.

Get Tubeless Tire Patents

Patents covering the basic features of tubeless tires were issued to The B. F. Goodrich Co., Akron, O., by the United States Patent Office on February 25. Invention of the tires was first announced publicly by the company in May, 1947. The new patents cover the tire's airtight lining, the air-sealing ridges that lock the tire to the wheel, and the sealant that heals punctures while the tires are in actual service. Patents on other features of the tires had previously been granted to the company.

To Expand Los Angeles Plant

A major expansion program under consideration for several months at Goodrich's Los Angeles, Calif., tire and tube manufacturing plant is now slated to move ahead, according to T. G. Graham, vice president.

In Los Angeles to confer with local plant management concerning the plan, Graham revealed that the awaited NPA authorization granted recently will permit construction to start soon on the project which will cost "in excess of $2,000,000."

Included in the expansion plan are new machinery and production facilities which will increase present tire and tube production by more than 20%. Other changes will involve a new, more efficient curing room, relocation and modernization of the tube manufacturing department, machine shop, cafeteria, and other units.

Building construction will call for an added 175,000 square feet of floor space, giving the plant a total area of 803,748 square feet devoted to production and warehousing. This follows a new 100,000-square-feet finished goods warehouse completed last year.

"This is our first major expansion here since the plant began operations in March, 1928," Graham said. "But in setting up our present plans we are anticipating the need for more production capacity and are engineering this expansion to allow for future additions."

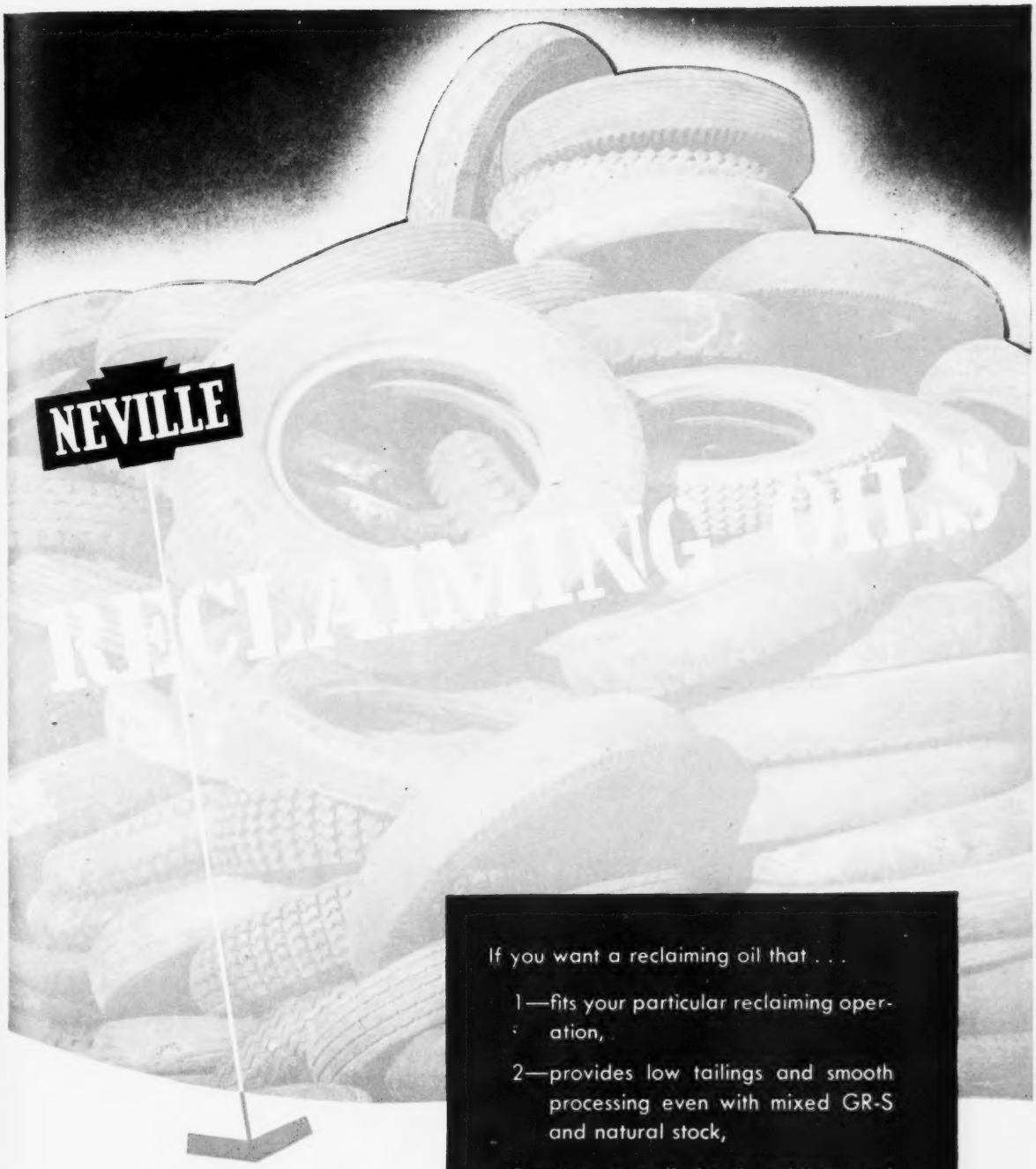
James F. Sweatt, manager of the Los Angeles plant, reports that construction is erpected to start in the third quarter of 1952 when final engineering is completed and building materials have been procured.

Huber Report

J. M. Huber Corp., 100 Park Ave., New York 17, N. Y., paid more than $1,100,000 to its employes under profit sharing and retirement plans out of its 1951 earnings, according to Hans W. Huber, president, in his annual report.

"Every Huber employe in 18 states and 22 cities in which we maintain manufacturing, distributing, or sales divisions participated in the profit-sharing plan if he was with the company six months or longer," Mr. Huber said.

The report also noted that both units of Huber's new furnace black plant at Eldon, Tex., began operation during 1951. The plant has an annual capacity of 76,000,000 pounds of HAF black. Mr. Huber further reported that the company has purchased a plant at Havre de Grace, Md., which will begin operations in May of this year to produce rubber pigments and chemicals. Huber drilled 58 new oil and gas wells during 1951, and the company now owns and operates 484 producing oil and gas wells in Texas, Kansas, Colorado, and Wyoming.



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WEST

Monsanto Annual Meeting

Monsanto Chemical Co., St. Louis, Mo., at its annual stockholders' meeting on March 25 reelected all directors, as follows: Edgar M. Queeny, Charles Allen Thomas, Robert R. Cole, Felix N. Williams, Carroll A. Hochwalt, Wm. W. Schneider, Francis J. Curtis, Wm. M. Rand, Charles S. Cheston, and Frederick M. Eaton.

President Thomas also told the stockholders that The Chemstrand Corp., owned partly by Monsanto and American Viscose Corp., would begin initial operations early this month, and that this fall limited amounts of products made from Acrilan fibers would be available in retail stores. Acrilan is a synthetic fiber made from acrylonitrile. The nylon plant which Chemstrand is building at Pensacola, Fla., will begin production late in 1953.

Other scheduled start-up dates for major Monsanto expansion projects also were reported by Thomas, including: the company's new acrylonitrile plant at Texas City, Tex., which will be in operation by the end of the year; a vinyl chloride monomer plant there, to start partial operation in the latter part of the third quarter and to be in full operation by the year's end, and a large addition to the styrene monomer plant, also at Texas City, to be in operation early in the third quarter. A new phenol plant at Avon, Calif., will begin operations early in 1954, and a 250-ton-a-day sulfuric acid plant, being constructed jointly by Monsanto and Tide Water Associated Oil Co. at Avon, will be in operation by the year's end. A new government-owned chlorine and caustic soda plant at Muscle Shoals, Ala., also was reported on by Thomas, who said Monsanto will operate the plant, half of which will be completed and in operation this month.

Personnel Changes

Monsanto has reported changes in assignments for several sales department representatives of its plastics division at Springfield, Mass.

Laurence H. Richards has been placed in charge of sales of Ultron vinyl film in New York, N. Y., where he formerly was on Vuepak sales.

Edgar S. Brockney has been transferred from Detroit to New York and assigned to Vuepak sales. Brockney was formerly in charge of Vuepak and sheet sales in Detroit, where he is succeeded by Gerald C. Clough, Jr.

Robert W. Riedel, of Easthampton, Mass., has been sent to New York as technical service representative for Ultron film.

Eli Haddad was shifted from the division research department to technical service work on Ultron film in the Springfield area.

Robert S. Garvie was switched from sheet sales to vinyl resin and compound sales in the New York area.

Edward F. Seitz, Jr., has assumed the sales accounts formerly handled by Garvie.

Thomas W. Sears, Jr., has been appointed sales representative for industrial resins in the New England territory of the plastics division. Joining Monsanto in 1946 as an engineer in the research department, Sears was employed as a technical service man in the sales department from 1947 to 1951.

William W. Leichman has been named adhesives sales representative for the North Carolina and Virginia area of the division. Prior to his association with Monsanto in October, 1951, he was affiliated with Penokee Veneer Co., and Splicedwood Corp.

Francis E. Woodill has been appointed assistant branch manager for plastics sales at the company's new Minneapolis-St. Paul sales office. He served in Monsanto's Chicago office since 1939 and previously had been employed in the plastics division's order and sales department in Springfield. Mr. Woodill is a member of the Society of the Plastics Industry and the Society of Plastics Engineers.

The appointments of J. A. Sherred as development director and F. Faxon Ogden as sales development manager for the Texas Division, were announced March 19.

Sherred, who joined Monsanto in Texas City in 1947, will head up the development functions of the division's research department, reporting to Herbert E. Morris, research director. Sherred has been engaged in research and engineering studies for the Texas Division.

Ogden will be responsible for the development and business research activities of the sales department, reporting to Robert U. Haslanger, division sales manager. Ogden, a member of the general development department in St. Louis, started with the company in 1935 as a research chemist.

Andrew Tomlin Promoted

Andrew J. Tomlin has been appointed assistant manager of rubber chemical sales. Tomlin, whose headquarters will be at Monsanto's organic chemicals division's rubber service department offices at Akron, O., has been technical service manager of the department since 1945. He joined the company in 1939.

New Camelback Plant

W. J. Voit Rubber Corp., Los Angeles, Calif., plans a camelback and tire repair materials manufacturing plant in Portland, Oreg., according to Willard Voit, president of the corporation which has been engaged in the manufacture of camelback and other tire repair materials for the past 31 years.

The plant will be housed in a 16,000-square-foot building situated on a 3½-acre site along Portland's North Columbia Blvd.

V. E. Holihan, general manager of Voit's camelback division in Los Angeles, who is training technical field representatives to service the area, said the factory will provide permanent employment for approximately 40 workers. Operations are expected to begin in July.

More than $300,000 worth of machinery will be installed, including three 60-inch rubber mills, one eight-inch extruder and auxiliary equipment.

Voit has promoted Herb Larson to advertising manager. A graduate of the University of Chicago, Mr. Larson was formerly assistant advertising manager of the company. In his new position he will be in charge of all advertising and publicity for the various corporation departments, including sporting goods, automotive hose, and camelback.

Minnesota Mining & Mfg. Co., St. Paul, Minn., last month opened a new Boston branch sales office and warehouse at 1330 Centre St., Newton Center, Mass., under W. M. Hobelsberger, Boston office manager, to service New England. Other branch officials who will headquarter in the new building are: J. J. Hargreaves, abrasive sales manager for industrial and refinish trades; A. S. Drew, sales manager for general-line tapes; H. B. Kosanke, sales manager for retail cellophane tape; and J. E. Warner, sales supervisor for "Scotchlite" brand reflective sheeting. The new warehouse also will stock adhesives and electrical tapes. Electrical tape sales will continue under the direction of E. F. Gregg, with headquarters in New York, N. Y. Howard Norman, also of New York, is sales manager for adhesives. Hardware maintenance sales of the Boston branch are under the direction of H. G. Kelley, of New York.

Link Belt Co., Chicago, Ill., at its annual meeting March 25 increased membership in its directorate to 14 by the election thereto of Robert C. Becherer, executive vice president of the company, and Wm. J. Kelly, president of Machinery & Allied Products Institute. Then at the board meeting which followed, Mr. Becherer was elected president to succeed George P. Torrence, who is retiring from active service in accordance with the company's retirement plan. All other officers were reelected.

Golden West Rubber Products, Inc., has purchased a building with 40,000 square feet of floor space at 2525 Fruitland Ave., Vernon, Calif., into which it plans to move in the near future. A modern and complete camelback plant will be installed.

Grand Prairie Rubber Co., Inc., Arlington, Tex., has changed its name to Oil States Rubber Co.

OBITUARY

Hugh W. Gregory

HUGH W. GREGORY, 62, vice president in charge of sales, Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., Canada, died in Toronto April 1 after a brief illness.

Mr. Gregory joined Seiberling 20 years ago as a salesman in the Los Angeles district. He left California to become Toronto branch manager in 1937 and served as eastern division manager before being named vice president in charge of sales.

He was born and educated in Virginia. Mr. Gregory also served overseas as an inantry captain with the U. S. Army during World War I.

He leaves his wife and a son. Funeral services were held April 4, at the York Brothers funeral home, Toronto. Burial was in Roanoke, Va.

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Albert G. Partridge

ALBERT GERRY PARTRIDGE, president of Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., for 16 years and more recently vice chairman of the board of directors, died March 12 at a Toronto hospital after an illness of several weeks.

Mr. Partridge was born August 26, 1880, in Jamestown, N. Y., where he attended grade and high schools, from which he was graduated in 1899.

Before joining Goodyear Tire & Rubber Co., Akron, O., he was associated with Diamond Rubber Co. and then Firestone Rubber Co. and for 15 years was vice president and sales manager of the latter company. With Goodyear since 1920, he served as manager of its western division, with headquarters in California; managing director of manufacturing and sales operations at the Goodyear plant, Wolverhampton, England (1928); vice president and director of the Canadian company (1935); president of that concern (1926); and finally vice chairman of the board (February, 1952). Mr. Partridge was also president of Goodyear Cotton Co., Ltd., St. Hyacinthe, P.Q., and a director of the Canadian cotton and rubber companies and of North American Life Insurance Co. of Canada.

The deceased, moreover, was a director and past president of the Rubber Association of Canada, past president of the Ontario Safety League, member of the executive council of the Canadian Chamber of Commerce, vice president and a director of the Canadian International Chamber of Commerce, and a member of the Council of Canadian Manufacturers. During the war he worked with the advisory committee on Rubber and Synthetic Rubber, Department of Munitions and Supplies, Ottawa. He also served on the planning board of the City of Toronto, was a member of the Empire Society and of Granite, Empire, National, Toronto, and Lambton Golf & Country clubs, and was affiliated with the Board of Trade, Toronto. He was a Shriner, Knight Templar, and 32nd degree Mason.

Funeral services were held at the family residence in Toronto, March 14, followed by graveside services, March 15, at Glendale Cemetery, Akron.

Mr. Partridge is survived by a son, two daughters, five grandchildren, and a brother.

Robert E. Powers

ROBERT E. POWERS, member of the public relations staff of The B. F. Goodrich Co., Akron, O., died of cancer March 30 in an Akron hospital.

The deceased was born in Decatur, Ill., 58 years ago. He was graduated from both elementary and high schools there, and attended James Millikan University.

Leaving school to work for the Wabash railroad, Mr. Powers soon afterward quit to embark up on a journalistic career. Then he joined the U. S. Army in 1917 and served overseas. When he returned to Akron, he resumed newspaper work. He joined Goodrich's public relations staff in April, 1932.

Mr. Powers belonged to the Wendell Willkie Post No. 19, American Legion.

Requiem Mass was sung April 2 at St. Vincent Church, followed by interment at Holy Cross Cemetery.

His wife, three brothers, and a sister survive.

William F. Gillespie

WILLIAM F. GILLESPIE, president of The Stamford Rubber Supply Co., Stamford, Conn., which he had founded in 1900, and vice president of The Gillespie Bros., Inc., newspaper publishers, died March 17 at his home.

A native of Stamford, Mr. Gillespie was born on November 10, 1878. He was graduated from Stamford High School in 1906 and from Yale University in 1910. Maintaining an active interest in the university after graduation, the deceased served as secretary of the Class of 1900 for several years, as alumni fund agent, and as a director of the Fairfield County Yale Alumni Association.

Long active in Stamford community and civic affairs, William Gillespie was general chairman of the Stamford Exposition of Progress (1926); president of the Stamford Chamer of Commerce (1927); first vice president of the Community Chest; an organizer and president of the Stamford Taxpayers' Association; president of the Boy Scout Council (1938); and a charter member and president of the Stamford Rotary Club (1925). His clubs included the Yale Club of New York and Woodway Country and Stamford Yacht Clubs.

During World War I he was a sergeant in the Second Stamford Company of the Connecticut Home Guard and was also active in Liberty Loan, YMCA, and Red Cross drives.

Three sons, one daughter, one brother, three sisters, and the widow survive.

Funeral services took place March 20 at the First Presbyterian Church, where Mr. Gillespie had been a trustee. A private burial followed in Woodlawn Cemetery.

Howard P. Protheroe

HOWARD P. PROTHEROE, former manager of the mechanical goods compound division, Goodyear Tire & Rubber Co., Akron, O., died March 4 at his home in Akron, after an illness of four years.

He was born in Scranton, Pa., 67 years ago. Mr. Protheroe was graduated from the University of Pennsylvania.

A Goodyear employe 34 years, he was a prominent chemist who won the Litchfield award for life saving in the disastrous Crile Hospital Clinic fire in Cleveland in 1929. In 1942, Goodyear loaned the deceased to the WPB to aid in the government's rubber conservation program. Mr. Protheroe was a member of Joppa Lodge 666, F.&A.M.; American Chemical Society; Akron Rubber Group; Turkeyfoot Island Club; and Golden Age Club. He was also an elder and one of the founders of Westminster Presbyterian Church.

Survivors include his wife, a son, and three sisters.

Funeral services were held March 7, at his church followed by interment in Rose Hill Burial Park.

Joseph Torrey

JOSEPH TORREY, an important figure in the early days of the rubber industry in Akron, died suddenly March 6 in San Diego, Calif.

Formerly a professor of chemistry at Harvard University, Dr. Torrey received his A.M. and Ph.D. degrees from Bowdoin College. He was born in East Hardwick, Vt., in 1862.

Starting as the first chief research chemist at Diamond Rubber Co. in 1900, under A. H. Marks, Dr. Torrey, in 1903, was advanced to general superintendent at Northwestern Rubber Co., Ltd., Litherland, England, Diamond's first reclaiming plant in Europe. He soon became vice president and general manager, and it was while serving in that capacity that he held leading positions in the organization and presentation of international rubber conventions in London during the years 1908-1914, acting as chairman of the International Rubber Congress during the last three years.

Since the deceased retired in 1923, he lived in San Diego.

Dr. Torrey leaves a son, four daughters, six grandchildren, and two great-grandchildren.

Foreign Trade Opportunities

The firms and industries listed below recently expressed their interests in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Klink & Andraos, Rue Al-Arz, Beirut, Lebanon: automobile parts and accessories.

Gabriel Arnaud, 9 Ave. Jean-Jaures, Pessac, Gironde, France: rubber boots and shoes.

Inter-Continental Trading Co., 652 Carabaya, Lima, Peru: hospital supplies and equipment.

COBENA, Via Manzoni 31, Milan, Italy: chemical products suitable for the plastics industry; raw cotton.

M. I. D. A., 5 Via Luigi Mercantini, Turin, Italy: plastic coated fabrics, artificial leather, and allied lines.

Import Opportunities

Helmut Schroers Gummiwerk Betriebs, G.m.b.H., Suedstrasse, Schoeppenstedt/Elm, Germany: technical molded rubber goods.

H. B. McDermott & Co., 57 Knightsbridge Court, Sloane St., London, S.W.1, England: rubber.

G. Siegle & Co. G.m.b.H., 2-10 Kruppstr., Stuttgart-Feuerbach, Germany: organic and inorganic pigments, including those for the rubber industry.

Baumwollindustrie Erlangen-Bamberg Aktg., 47 51 Bruckerstrasse, Erlangen, Bavaria, Germany: tire cord.

Ceylon Shoe Co., Ltd., 22 Upper Chatham St., Fort, Colombo, Ceylon: rubber soled canvas shoes, rubber slippers, and sandals.

Moulded Components (Jablo), Ltd., Jablo Works, Mill Lane, Waddon, Croydon, Surrey, England: "Aero Jablex," lightweight thermoplastic sheets.

Soc. Rhovyl, 21 Rue Jean Goujon, Paris (8ème), France: synthetic threads and fibers made of polyvinyl chloride.

Heyne & Co., Hornstr., 17, Berlin SW 61, Germany: artificial leather bookcovers.

Wilhelm Mueller K.-G., 34 Tillystrasse, Nuremberg, Bavaria, Germany: steel molds for pressing and die casting plastics.

Vulnoplast Lakemeier K. G., Brueckenstrasse, Bonn, Germany: sticking plaster and adhesive bands.

Värme & Sanitets AB IDO, 32-34 Luntmakaregatan, Stockholm, Sweden: pure latex tubes.

Ernst von der Gruen, 38 Industriestrasse, Nuernberg, Bavaria, Germany: diecasting molds for plastics.

Georg von Klaudy G.m.b.H., 77 Prinz-Fredrich-Karlstrasse, Dortmund, Germany: tire and tube self-vulcanizing repair patches.

N. V. Fabron, 6 Candialaan, Rhenen, Netherlands: "Recticel" casting products, a new rubber product to replace foam rubber.

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1711

ATHENS MACHINE DIVISION

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NEWS ABOUT PEOPLE

Noel S. Worrell has been elected vice president in charge of traffic for American Zinc, Lead & Smelting Co., St. Louis, Mo. Mr. Worrell joined the organization at Columbus, O., in 1920, where he served in traffic and sales for a number of years. In 1934 he was appointed central district sales manager and assistant traffic manager at Columbus, and in 1941 general traffic manager at St. Louis.

Maurice F. Murphy has been appointed to the staff of chemical engineers at Atlantic Research Corp., Alexandria, Va. Previously he had been employed by the Combustion Subcommittee of the National Advisory Committee for Aeronautics, Washington, D. C.

Alfred J. Ensor has been appointed technical manager of James Day (Machinery), Ltd., 28 Maddox St., London, W.1, England. Mr. Ensor was for many years chief engineer of St. Helens Cable & Rubber Co., Ltd., and prior to that, assistant engineer with Beldam Packing & Rubber Co., Ltd. He will shortly pay an extended visit to the United States to discuss developments with the various machinery manufacturers with which his firm is associated. The Day company is an importer of wire and cable and textile machinery and also acts as agent for several companies including John Royle & Sons and New England Butt Co.

Eric Bonwitt this month marks the fiftieth anniversary of his service in the rubber industry. He started in Hannover, Germany, the European rubber capital, in April, 1902, and formed his own business after World War I, which he continued until 1938, when he decided to come to the United States. Soon after his arrival in Akron, O., he established again his own firm and after World War II moved his offices to Chicago. From here he continues his business activities as a dealer of new and used machines for the rubber and plastic industries throughout the world.

Eric Bonwitt

E. A. Johnson has been appointed district manager in the resin sales section of The Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. Mr. Johnson, formerly with Borden Co.'s chemical division, will handle sales throughout the eastern district for Barrett's developing resin-sales program.

John L. Craig has been appointed sales representative, assigned to the Cincinnati office, of Michigan Alkali Division, Wyandotte Chemicals Corp., Wyandotte, Mich. Mr. Craig joined Wyandotte Chemicals' market development department in 1949. As a technical field representative, he was responsible for the technological development of the many new organics produced at Wyandotte over the last few years. Prior to employment by Wyandotte, Mr. Craig was associated with E. I. du Pont de Nemours & Co., Inc., working on coated fabrics and finishes at its Newburgh and Philadelphia plants.

Richard R. Ketchum, formerly a salesman for Avon Sole Co., Avon, Mass., is now the company's advertising manager.

Miss Jessie May Smith has been made administrative assistant to the president of American Resinous Chemicals Corp., Peabody, Mass., which was founded in 1942 and is an affiliate of American Research and Development Corp., Boston, Mass. Miss Smith has been with American Resinous since 1944 and until recently handled sales promotion correspondence. During the late war she worked for the War Production Board in Washington, D. C.

Morris C. Hay has been appointed director of employe relations at The B. F. Goodrich Rubber Co. of Canada, Ltd., Kitchener, Ont. In this position Mr. Hay will head the company's employe relations division, newly formed to coordinate present employe relations functions, to promote mutual undertanding, and to increase the effectiveness of the organization. Mr. Hay, who will continue as Goodrich's counsel and assistant secretary, left his private law practice in 1944 to join the Goodrich company.

Frederick K. Lacher has been appointed assistant secretary in charge of patent work for National Rubber Machinery Co., Akron 8, O. Prior to joining NRM, Mr. Lacher had been employed in the patent department of The B. F. Goodrich Co. He is a member of the Bar of the State of Ohio and a registered patent attorney. He belongs also to several bar associations and the Cleveland Patent Law Society.

A. B. Fields has been appointed manager of the rubber plant in Muncie, Ind., of Ball Bros. Co., Inc., to succeed **George P. Mitchel,** who resigned recently. Mr. Fields joined the Muncie firm following a 20-year association with the Firestone Tire & Rubber Co., most recently as chief development engineer for Firestone Industrial Rubber Products Co., Noblesville, Ind.

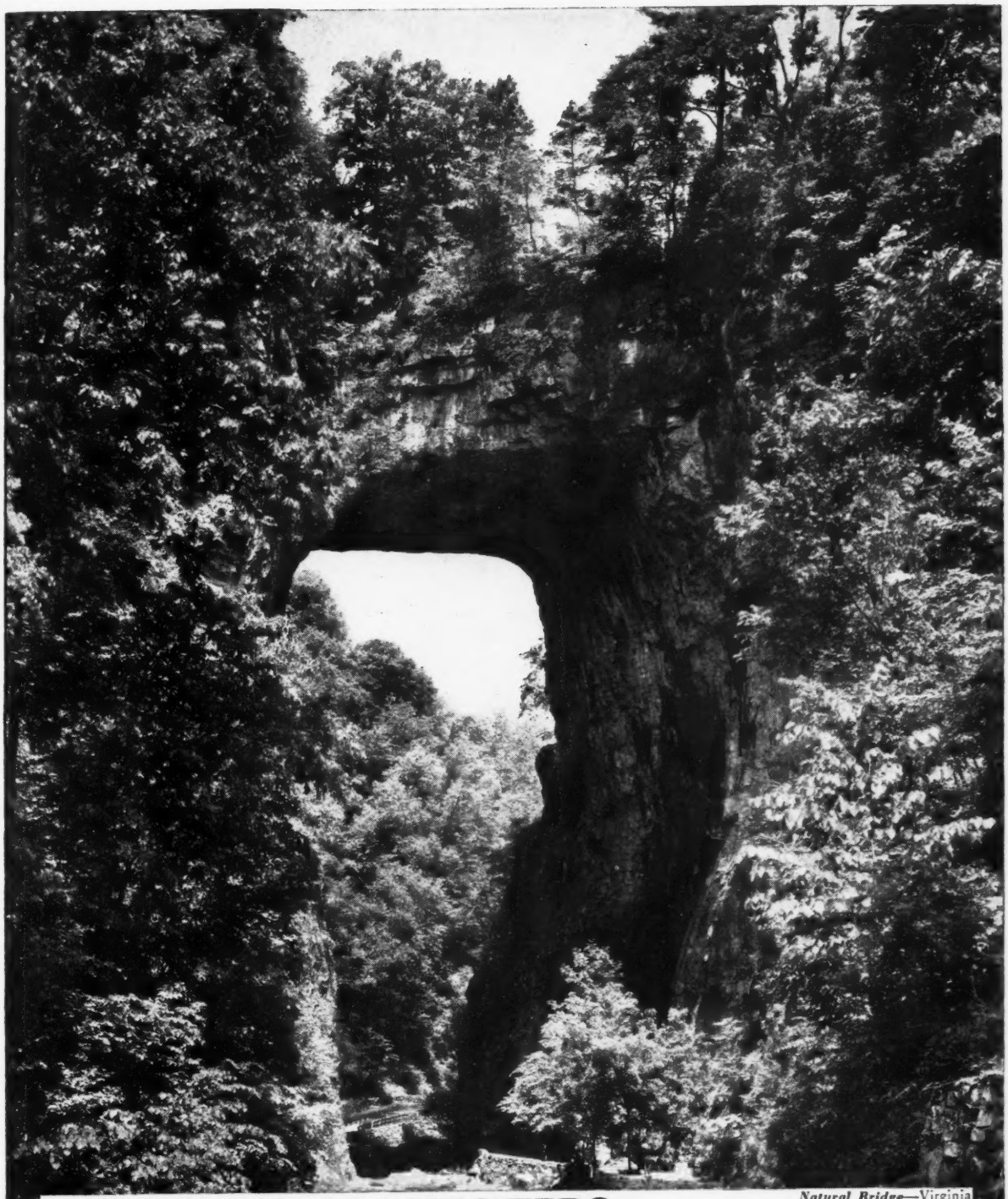
G. W. Huldrum, Jr.

G. W. Huldrum, Jr., has been appointed sales manager of the western division of Shell Chemical Corp., 50 W. 50th St., New York 20, N. Y. Huldrum began his career as a chemist at Shell Chemical's Pittsburgh, Calif., plant in 1939 and progressed through various manufacturing and marketing assignments in California, Texas, and New York. In 1947 he was appointed district manager of the Detroit sales office, two years later returned to San Francisco as manager of agricultural products, western division, and in 1951 became assistant sales manager, western division. In his new position Huldrum heads sales activities in ammonia and ammonium sulphate fertilizers, solvents for varnishes and lacquers, and plastics and resins.

William A. Schnell, sales engineer for 40 years with Link Belt Co., is now associated with the sales staff of Consolidated Products Co., Inc., rebuilt chemical machinery dealers, 15 Park Row, New York 7, N. Y.

George M. Naylor is now associated with E. P. Lambert Co., Akron, O., as West Coast representative. Mr. Naylor was a crude rubber buyer for Fisk Rubbe Co. and then for The B. F. Goodrich Co. for many years, both in Akron and the Far East. His temporary headquarters will be at 1272 Linda Vista Ave., Pasadena 2, Calif.

Godfrey Lowell Cabot, 92, New England's No. 1 aviation pioneer, was named honorary president of the Aero Club of New England at a luncheon-meeting at the University Club, Boston, Mass., March 23, and received a plaque in recognition of his many valuable contributions to aviation progress. Dr. Cabot is active president and chairman of the board of Godfrey L. Cabot, Inc., Boston, the firm which he founded in 1882 and one of the world's largest manufacturers of carbon blacks. In 1915, despite his 54 years, Dr. Cabot learned to fly. He flew a plane on World War I anti-submarine patrol off the Massachusetts coast in 1917 as a Naval Reserve lieutenant.



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FINANCIAL

Allied Chemical & Dye Corp., New York, N. Y. For 1951: net income, $40,549,000, equal to $4.58 a common share, against $41,212,000, or $4.65 a share in 1950; federal income and excess profits taxes, $66,159,000, against $32,823,000.

American Cyanamid Co., New York, N. Y., and subsidiaries. Year ended December 31, 1951: net profit, $34,788,084, equal to $8.63 a common share, contrasted with $33,739,401, or $10.14 a share, the year before; net sales, $388,716,990, against $322,338,188; income taxes, $39,500,000 against $30,000,000.

American Hard Rubber Co., New York, N. Y., and subsidiary. Twelve months to December 31, 1951: net profit, $725,545, equal to $6.91 each on 88,477 common shares, compared with $902,773, or $8.91 a share, in the preceding 12 months; net sales, $22,104,523, against $17,255,959.

Belden Mfg. Co., Chicago, Ill. For 1951: net profit, $1,161,576, equal to $3.62 a common share, against $1,528,839, or $4.77 a share, in 1950.

Brunswick-Balke-Collender Co., Chicago, Ill. For 1951: net earnings $1,192,456, equal to $2.37 a common share, contrasted with $2,412,116, or $5.08 a share, the year before.

Canada Wire & Cable Co., Ltd., Leaside, Ont. For 1951: net income, $2,100,634, equal to $10.30 a Class B share, against $1,932,108, or $10.06 a share, a year earlier.

Philip Carey Mfg. Co., Cincinnati, O. For 1951: net earnings, $2,984,196, equal to $3.62 a common share, compared with $3,710,142, or $4.52 a share, in 1950; net sales, $55,223,670, against $50,734,636.

Columbian Carbon Co., New York, N. Y., and subsidiaries. Year ended December 31, 1951: net profit, $5,469,279, equal to $3.39 each on 1,612,218 capital shares, compared with $6,149,161, or $3.81 a share, in the preceding year; sales, $50,008,607 (a record figure), against $48,680,481; income taxes, $4,630,000, against $4,100,000; excess profits taxes, $420,000, against $400,000.

Dewey & Almy Chemical Co., Cambridge, Mass. For 1951: net earnings, $1,394,602, equal to $1.53 each on 913,898 common shares, compared with $1,936,056, or $2.12 a share, in the year previous; sales, $29,183,192 (a new high), against $22,258,857.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. For 1951: net income, $220,743,811, equal to $4.64 a common share, contrasted with $307,601,913, or $6.59 a share, in 1950; sales, $1,531,128,120 (a record), against $1,297,473,345; federal income taxes, $360,040,000, against $212,870,000.

Garlock Packing Co., Palmyra, N. Y. For 1951: net earnings, $1,943,443, equal to $4.64 a common share, against $1,493,950, or $3.56 a share, in 1950.

General Cable Corp., New York, N. Y. Year ended December 31, 1951: net profit, $5,506,949, equal to $2.48 each on 1,933,372 common shares, compared with $3,354,673, or $1.36 each on 1,917,646 shares, the year before; federal income and excess profits taxes, $11,800,000, against $1,915,453; current assets, $38,295,980, current liabilities, $22,510,203, against $27,366,007 and $13,827,004, respectively, on December 31, 1950.

General Electric Co., Schenectady, N. Y. Year ended December 31, 1951: consolidated net income, $138,116,527, equal to $4.79 each on 28,845,927 capital shares, compared with $173,423,702, or $6.01 a share, in 1950: net sales, $2,319,347,956, against $1,960,429,446; federal income taxes, $211,902,000, against $166,718,000; excess profits taxes, $65,598,000, against $30,282,000.

General Motors Corp., Detroit, Mich. For 1951: net income, $506,199,560, equal to $5.63 a common share, against $834,044,039, or $9.35 a share, the year previous.

General Tire & Rubber Co., Akron, O., and subsidiaries. Year ended November 30, 1951: net profit, $7,016,640, equal to $11.17 each on 593,501 common shares, contrasted with $8,557,616, or $13.88 each on 586,419 shares, in the preceding fiscal year; net sales $170,771,521, against $125,375,837; income and excess profits taxes, $12,750,000, against $7,160,800; current assets, $64,922,045, current liabilities, $31,884,545, against $54,155,665 and $15,263,906, respectively, on November 30, 1950.

Hewitt-Robins, Inc., New York, N. Y. For 1951: net earnings, $1,038,219, equal to $3.73 a common share, against $1,266,929, or $4.55 a share, in 1950; sales, $36,307,105, against $23,451,792.

Byron Jackson Co., Los Angeles, Calif. Twelve months to December 31, 1951: net income, $2,020,000, equal to $3.81 each on 529,857 shares, against $1,338,295, or $3.53 each on 378,680 shares, in the preceding 12 months.

Jenkins Bros., Bridgeport, Conn., and subsidiary. For 1951: net income, $556,314, equal to $4.36 a share, against $652,581, or $4.97 a share, the year before.

Minnesota Mining & Mfg. Co., St. Paul, Minn., and domestic subsidiaries. Year ended December 31, 1951: net profit, $15,738,452, equal to $1.92 a common share, compared with $20,318,904, or $2.51 a share, in 1950; net sales, $170,067,527, a new high, against $152,806,313; federal income taxes, $23,900,000, against $20,712,000.

Mount Vernon-Woodberry Mills, Inc., New York, N. Y. For 1951: net profit, $4,192,100, equal to $13.06 a common share, against $2,225,078, or $6.91 a share, in 1950.

Mansfield Tire & Rubber Co., Mansfield, O. For 1951: net profit, $2,107,414, against $2,525,487 in 1950.

Mohawk Rubber Co., Akron, O. For 1951: net income, $1,072,313, a new high and equal to $7.57 a common share, against $596,097, or $4.21 a share, in 1950; net sales, $20,884,078 (another record), against $11,551,554; reserve for federal income and excess profit taxes, $2,283,025, against $458,152; current assets, $6,843,031, current liabilities, $3,654,422.

National Automotive Fibres, Inc., Trenton, N. J., and subsidiary. Year ended December 31, 1951: net income, $3,200,220, equal to $3.21 each on 996,145 capital shares, contrasted with $4,779,025, or $4.80 a share, in the preceding year; sales, $86,764,932 (a new high) against $76,053,409; income and excess profits taxes, $4,405,000, against $4,265,000.

National Lead Co., New York, N. Y. For 1951: net income, $22,993,717, equal to $2.05 a common share, compared with $26,490,644, or $2.41 a share, in 1950; sales, $389,941,313, against $342,727,911.

National Rubber Machinery Co., Akron, O. Year ended December 31, 1951: net profit, $675,628, equal to $3.84 each on 176,000 capital shares, compared with $335,821, or $2.18 each on 154,000 shares, in the previous year; net sales, $12,016,027, against $5,196,587.

O'Sullivan Rubber Corp., Winchester, Va. For 1951: net income, $219,499, against $315,352 in 1950.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. Year ended December 31, 1951: net earnings, $73,711,229, equal to $5.45 each on 14,423,139 capital shares, contrasted with $51,557,264, or $4.25 each on 6,084,968 shares, the year before; federal income taxes, $22,210,376, against $26,191,300.

Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., and subsidiaries. Year ended December 31, 1951: net income, $3,093,000 (a record), equal to $4.08 each on 729,266 common shares, contrasted with $2,788,000, or $3.67 each on 560,974 shares, a year earlier; sales $48,663,000 (another record), against $36,012,000; income taxes, $6,707,000, against $2,058,000.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. Year ended December 31, 1951: net profit, $4,857,140, equal to $7.73 each on 628,100 capital shares, compared with $4,868,769, or $7.75 a share, in the preceding year; net sales, $84,866,074, against $65,444,665; income taxes, $11,250,000, against $5,675,000; current assets, $31,191,640, current liabilities, $10,930,033, against $27,984,368 and $8,039,112, respectively, on December 31, 1950.

Thiokol Corp., Trenton, N. J. For 1951: net earnings, $119,239 equal to 39¢ a common share, against $90,670, or 30¢ a share, in 1950.

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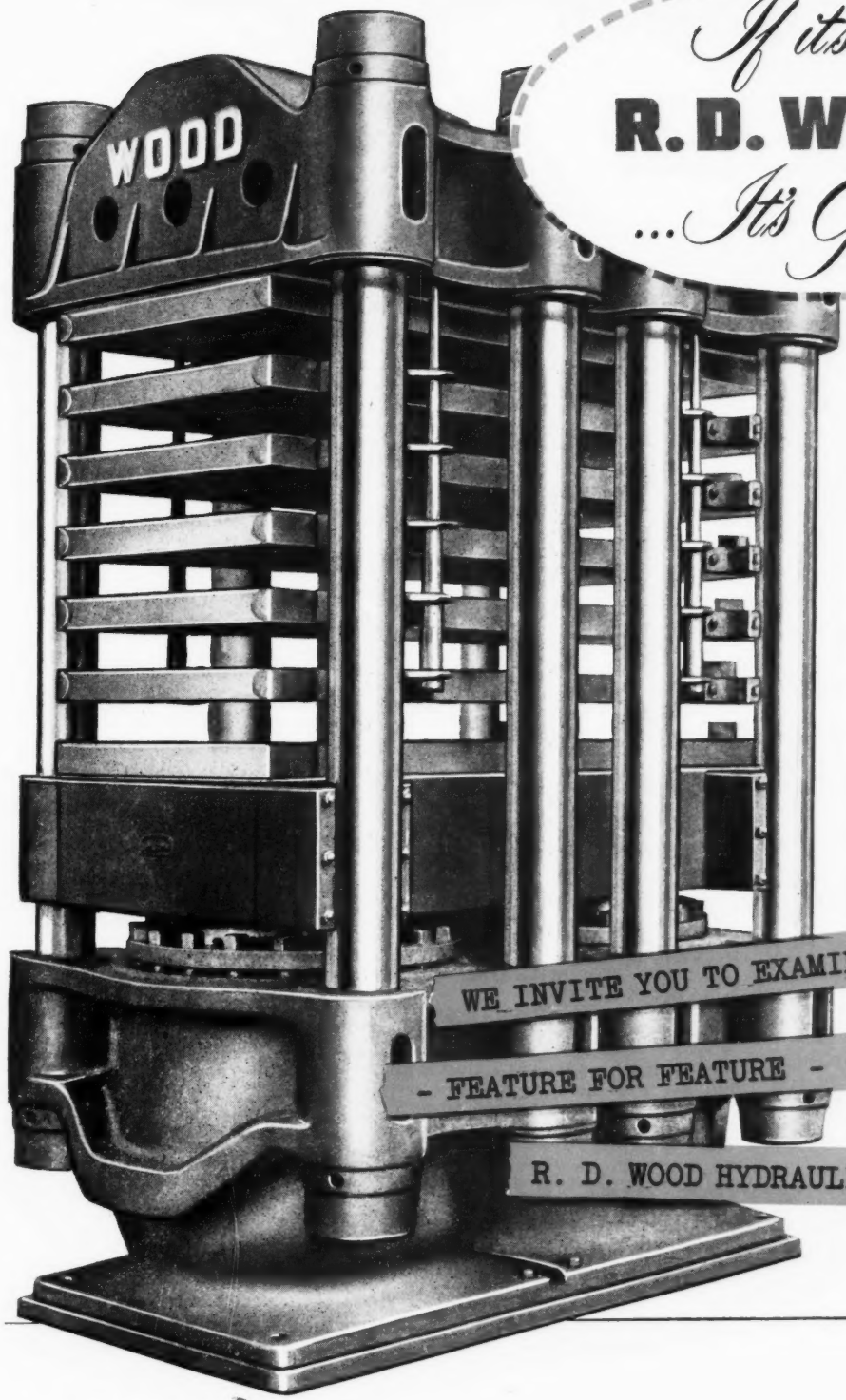

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St. Joseph Lead Co., New York, N. Y., and domestic subsidiaries. For 1951: net earnings, $13,577,236, equal to $5.50 each on 2,469,320 capital shares, against $12,211,615, or $4.94 a share in 1950; net sales, $110,834,083, against $103,871,428; income taxes, $10,687,396, against $7,188,769; excess profits taxes, $3,132,421, against $787,698.

Seiberling Rubber Co., Akron, O., and subsidiaries. For 1952: net income, $1,216,574, equal to $3.30 each on 301,010 common shares, contrasted with $1,815,560, or $5.26 a share, in the preceding year; net sales, $43,081,425, against $38,321,118; income and excess profits taxes, $2,395,215, against $2,441,019; current assets, $15,283,882, current liabilities, $5,625,479, against $14,087,591 and $4,639,281, respectively, on December 31, 1950.

Skelly Oil Co., Kansas City, Mo., and subsidiary. Year ended December 31, 1951: net income, $31,074,985, equal to $11.89 each on 2,611,872 capital shares, compared with $28,514,066, or $10.91 a share, in the preceding year; provision for income taxes, $10,695,000, against $10,595,000.

Taylor Instrument Cos., Rochester, N. Y. Six months ended January 31, 1952: net profit, $627,414, equal to $3.48 a share, against $534,019, or $2.96 a share, a year earlier.

Timken Roller Bearing Co., Canton, O. For 1951: net profit, $14,068,109, equal to $5.81 a share, against $15,402,720, or $6.36 a share, the year before; net sales, $188,656,018, against $144,054,617.

United Carbon Co., Charleston, W. Va., and subsidiaries. For 1951: net income, $3,645,561, a record and equal to $4.58 each on 759,770 common shares, compared with 3,364,654, or $4.23 a share, in 1950; net sales, $33,381,750 (another high), against $29,780,195; income taxes, $2,327,000, against $2,144,000.

United Elastic Corp., Easthampton, Mass., and wholly owned subsidiaries. For 1951: net earnings, $2,129,492, equal to $8.63 a share, against $1,732,411, or $7.02 a share, in 1950.

United Engineering & Foundry Co., Pittsburgh, Pa., and subsidiaries. For 1951: net income $3,845,157, equal to $4.62 a common share, compared with $5,298,884, or $6.39 a share, in 1950; net sales, $67,388,758, against $66,860,759, the previous high in the company's history.

Westinghouse Air Brake Co., Wilmerding, Pa. For 1951: net profit, $11,572,652, equal to $2.81 a common share, against $11,276,058, or $2.73 a share, in 1950.

S. S. White Dental Mfg. Co., Philadelphia, Pa. For 1951: net earnings, $1,238,520, equal to $3.53 a capital share, compared with $833,192, or $2.38 a share, in 1950; net sales, $24,434,122, against $20,912,840; income taxes, $1,875,000, against $705,000.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$0.50	Mar. 31	Mar. 25
	7% Pfd.	1.75 q.	Mar. 31	Mar. 25
Armstrong Rubber Co.	Cl. A Com.	0.50 q.	Apr. 1	Mar. 14
	4¾% Pfd.	0.59⅜ q.	Apr. 1	Mar. 14
Circle Wire & Cable Corp.	Com.	0.35	Mar. 27	Mar. 13
Crown Cork International Corp.	$1.00 Cl. A	0.25 q.	Apr. 1	Mar. 10
Denman Tire & Rubber Co.	5% Pfd.	0.12½	Mar. 31	.....
Dewey & Almy Chemical Co.	$1.00 Com.	0.30	Mar. 20	Mar. 10
E. I. du Pont de Nemours & Co., Inc.	Com.	0.85	Mar. 14	Apr. 25
	$4.50 Pfd.	1.12½ q.	Apr. 25	Apr. 10
	$3.50 Pfd.	0.87½ q.	Apr. 25	Apr. 10
Garlock Packing Co.	Com.	0.25 q.	Mar. 31	Mar. 19
General Cable Corp.	Com.	0.15	Apr. 1	Mar. 21
	1st Pfd.	1.00 q.	Apr. 1	Mar. 21
	2nd Pfd.	0.50 q.	Apr. 1	Mar. 21
General Tire & Rubber Co.	4½% Pfd.	1.06¼ q.	Mar. 31	Mar. 21
	3¾% Pfd.	0.93¾ q.	Mar. 31	Mar. 21
	2nd Pfd.	0.81¼ q.	Mar. 31	Mar. 21
B. F. Goodrich Co.	Com.	0.50	Mar. 31	Mar. 7
	$5.00 Pfd.	1.25 q.	Mar. 31	Mar. 7
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00	Mar. 31	Mar. 10
Johns-Manville Corp.	Com.	0.75 q.	Mar. 13	Mar. 3
Mansfield Tire & Rubber Co.	Com.	0.40 init.	Mar. 20	Mar. 12
Midwest Rubber Reclaiming Corp.	Com.	0.25 q.	Apr. 1	Mar. 12
	4½% Pfd.	0.56¼ q.	Apr. 1	Mar. 12
Minnesota Mining & Mfg. Co.	Com.	0.25	Mar. 12	Feb. 21
	$4.00 Pfd.	1.00 q.	Mar. 12	Feb. 21
Mohawk Rubber Co.	Com.	0.25 q.	Mar. 31	Mar. 14
		0.25 extra	Mar. 31	Mar. 14
Raybestos-Manhattan, Inc.	Com.	0.50	Mar. 12	Feb. 29
Rome Cable Corp.	4% Cum. Conv. Pfd.	0.30	Apr. 1	Mar. 7
	Com.	0.25	Mar. 28	Mar. 7
		0.10 extra	Mar. 28	Mar. 7
A. G. Spalding & Bros., Inc.	Com.	0.25 q.	Mar. 14	Mar. 7
United States Rubber Co.		50¢ Stk.	May 15	Apr. 23
U. S. Rubber Reclaiming Co.	$1.40 Pfd.	0.35 q.	Apr. 1	Mar. 21

Neoprene Solutions

(*Continued from page 98*)

lization rates; Types RT and WRT crystallize slowly; and Types FR and Q crystallize very slowly. The speaker also discussed adhesive properties obtained with the various neoprenes, together with the effects of aging, crystallization rate, and compounding on these properties.

Electrical Charges in Rubber Compounding

Another meeting of the Elastomer & Plastics Group also was held at MIT, on March 20. The speaker was Robert S. Havenhill, St. Joseph Lead Co., who discussed "The Role of Electrical Charges in Rubber Compounding."

Mr. Havenhill stated that although the presence of positive and negative charges on rubber, pigments, and other compounding ingredients has been known for years, little has been done to relate these facts with the chemical and physical properties or behavior of these materials until comparatively recently, when adequate measuring equipment was first developed and applied to the problems in this field.

The contact potentials developed between unlike surfaces on a rubber mill, or in a Banbury, have been found to play a decisive part in determining the rate of mixing and the ultimate qualities of the cured compound. A pigment should have an electrostatic charge as large as possible and opposite in sign to the charge on the elastomeric compound at the time it is added to the mix.

The relative charges on ingredients do not play the only important part electrically in scientific compounding. The final potential of the compounded stock is an effective measure of the strength of the compound; the more positive its value the greater the tensile strength the speaker added.

Utilizing the type of equipment described, which converts a static electric field into alternating current, then measures its value and sign and records these facts in chart form electrically, it is possible to determine mixing efficiencies and cycle completion points which frequently are not otherwise detectable.

The importance to users of such equipment is felt to be the propable improvement in pigment dispersion and cost reduction through the proper selection of sequence and timing of mixing operations, differing as they will with the various types of elastomers now in use, Mr. Havenhill said in conclusion.

Ordnance Rubber Goods

A TALK on "Army Ordnance Mechanical Rubber Goods," by Gerald Reinsmith, Army Ordnance Corp., highligted the March 21 dinner-meeting of the Chicago Rubber Group. Approximately 200 members and guests were present at the meeting, held at the Morrison Hotl, Chicago, Ill.

Mr. Reinsmith outlined the organization of the various government boards administering the defense program and showed how the Ordnance Corps fits into the general program. A new idea for an ordnance item goes to a technical committee which sets up specifications and farms out the project to an industrial firm. A prototype is made and tested both at the proving grounds and in the field. After any needed improvements have been made, the item is then put into production by means of open bidding from industry. Ordnance procurement is centered in three offices, although some arsenals procure certain items directly. For information on government bids and contracts, manufacturers should contact their local district offices of the Ordnance Corps.

The speaker also described the different mechanical rubber goods purchased by the Corps and discussed the specifications and special properties required. To illustrate the talk, there was a display of many types of mechanical goods used by the Armed Services.

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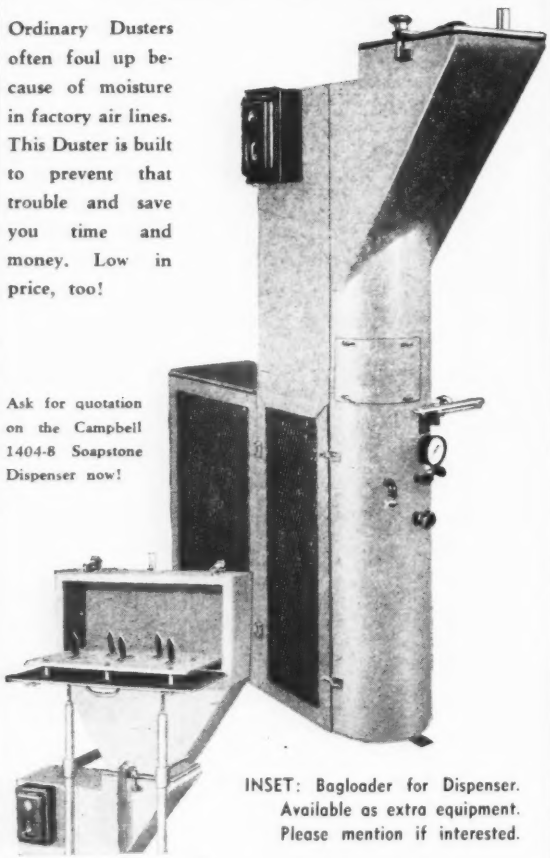

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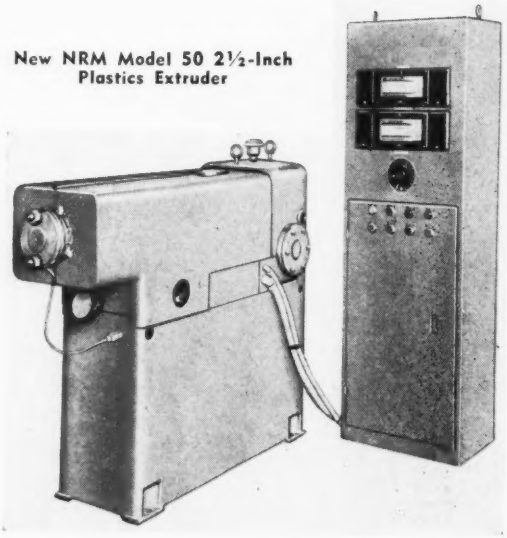
New Machines and Appliances

New NRM Model 50 2½-Inch Plastics Extruder



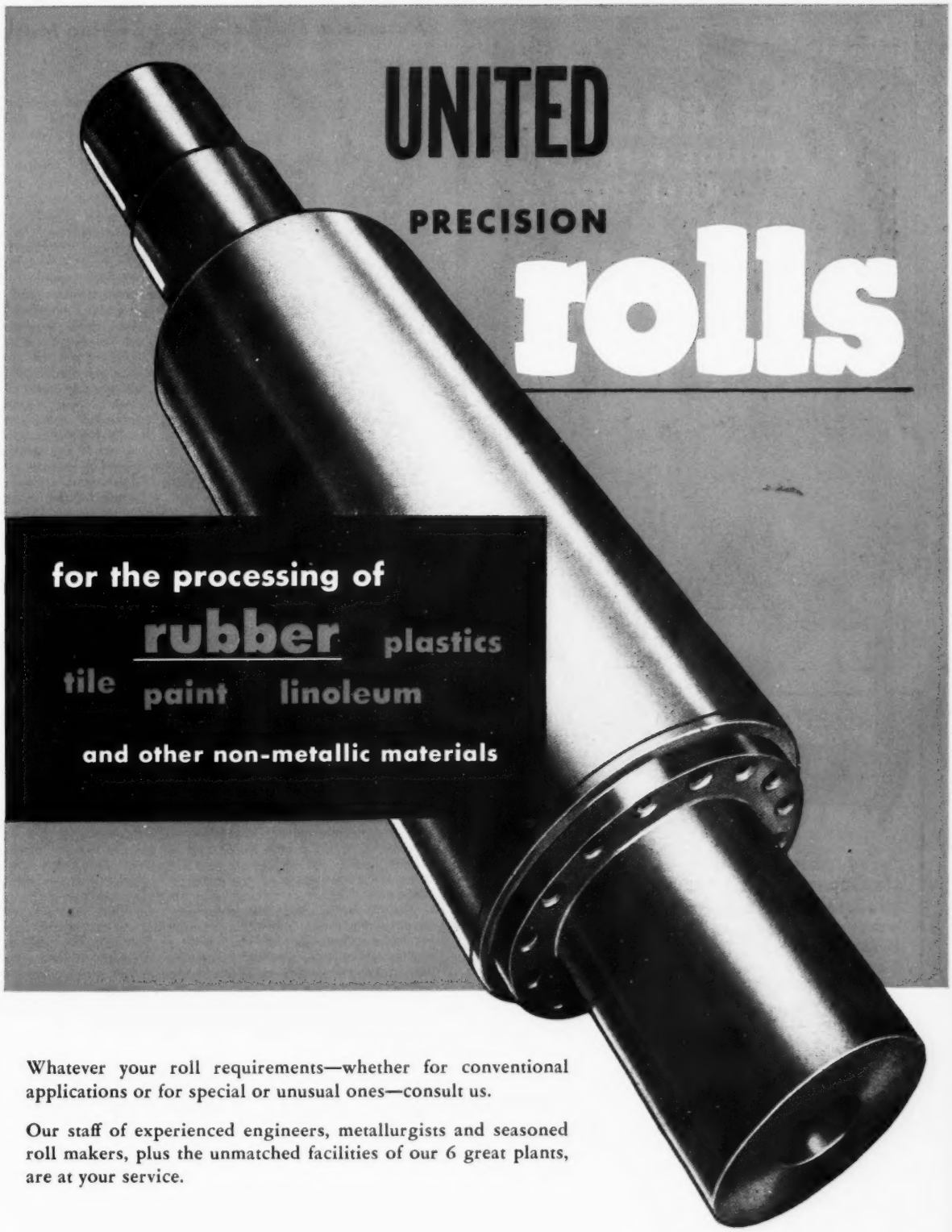
New Plastics Extruder

THE availability of a new Model 50, 2½-inch electrically heated plastics extruder has been announced by National Rubber Machinery Co., Akron 8, O. Designed for use in the latest extrusion techniques, Model 50 has a number of new features, as follows: convenient control cabinet for either left- or right-hand operation; faster operating die adapter gate for quicker die and screen changes; a single sturdy steel base for both drive transmission and cylinder; heavy-duty cone gear for greater drive and longer life; and a more compact, streamlined design for easier and safer operation.

Standard NRM features that have been retained include the hollow bored feed screw of heat treated alloy steel with flame hardened flight surfaces; the company's "Balanced Heat Control" design; water cooled feed hopper; replaceable Xaloy 396 cylinder liner; and proportioning-type pyrometer controls. Complete accessories are available, including tachometer, ammeter, and tubing dies.

Long Flex Life?

SEE PAGE 4



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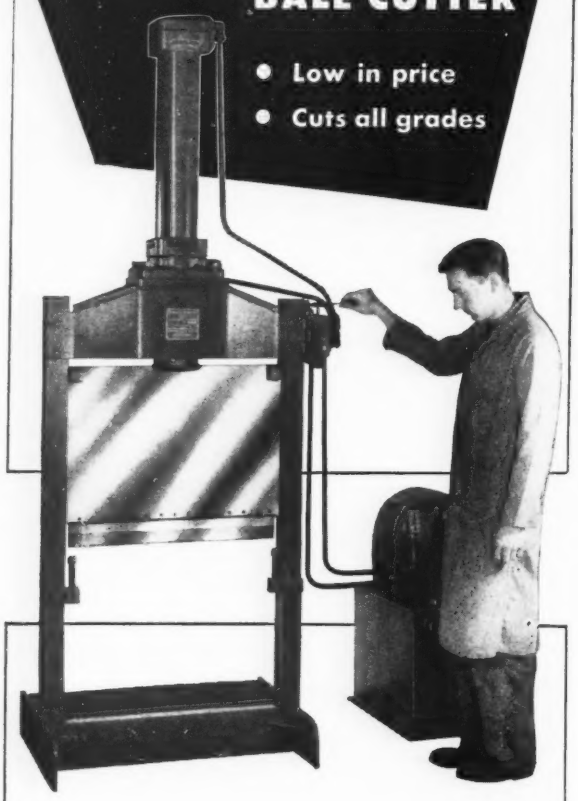

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As illustrated, it is a complete, self-contained unit with pump, tank, and 5 H.P. motor. Knife--29¼" wide. Stroke--23". Height--8' 5". Floor Space--36" x 64". And--the initial cost is low.

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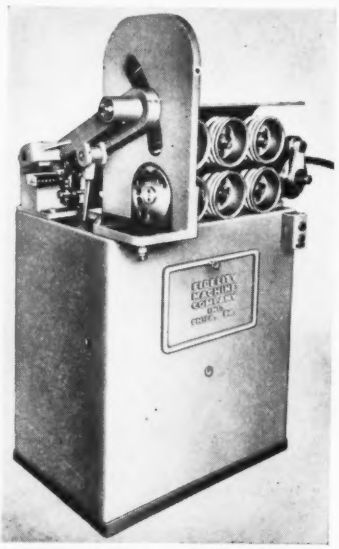
Automatic Measuring and Cutting Machine



Fidelity Automatic Rubber Measuring and Cutting Machine, Model A

THE Fidelity automatic rubber measuring and cutting machine, a new machine for cutting rubber or plastic hose and many extruded shapes into predetermined lengths, has been announced by Fidelity Machine Co., Inc., 3908 Frankford Ave., Philadelphia 24, Pa. The machine automatically feeds, measures, counts, and cuts hose or extruded products with a minimum of operator attention. The cutter will handle hose of knit, wrapped, or braided construction, and hose with a stranded ground wire.

Production rates of up to 45 accurately cut pieces a minute can be achieved in any cut length from one inch to 12 feet. Occupying only six square feet of floor space, the machine is made in two models: Model A for hose diameters from ½-1¼ inches, including washing machine and auto heater hose; and Model B for larger hose diameters, including auto radiator hose.

In operation, one end of the hose is fed into the cutter by the operator. A simple, positive action adjustment allows the operator to set the machine to cut the required length of hose, as indicated by a graduated scale which is an integral part of the machine. Six geared feed rolls hold the hose firmly and eliminate any chance of slippage. All feed rolls are power driven; the top set is spring loaded for self-compensating and adjustable tension.

The specially designed alloy steel cutting blade is mounted on a ball-bearing spindle at the end of the cutting arm and is driven by a two-horsepower motor. The feed mechanism holds the hose securely at several points during the cutting operation to assure a perfectly straight cut edge. Both the feeding and the cutting mechanisms are highly accurate to maintain the closest tolerances on the length of the cut pieces. During the downward stroke of the cutting arm a small fluid jet lubricates both the hose and the blade. The downward stroke also actuates an automatic counter to indicate the number of pieces cut.

Sturdy, foolproof safety guards are provided for all moving mechanisms of the machine. In addition, the automatic features of the machine eliminate any need of handling the hose or the cutting mechanism during operation. Standard cutters are designed for permanent installation upon connection to the factory water supply and drain. Where a mobile unit or the use of special cutting fluids is required, the cutter can be supplied complete with built-in pump and tank unit.

New Dust Collectors

A NEW cloth-bag collector for dusts such as carbon black, pigments, lampblack, metal oxides, cork, graphite, and other materials is being offered by Pangborn Corp., Hagerstown, Md. This collector provides dust control at low initial cost by means of simplified design of filter bags and mechanism for reclaiming dust. These collectors range from 5-40 feet in length, contain from 1,360-10,880 square feet of filter cloth, employ from 1-6 hoppers, and are supplied with appropriate structural supports to furnish the type of disposal desired.

Bags are fastened, open end down, by wing nuts to suspension members. Each bag contains a rubber hem at the open nozzle end to insure dusttight fitting of bags to the grid plate. The nozzles are sealed over grid openings in the floor of the collector. In operation, dust-laden air piped from the plant enters the collector at a point just under the grid floor. The air loses velocity, and the heavier particles immediately fall into the hoppers. The air then rises through the grid into the filter bags which capture the remaining dust particles. The

(*Continued on page* 143)

EUROPE

FRANCE

Tires on Subway Trains

On November 14, 1951, the Metro, Paris underground, officially introduced the first pneumatic-tired train to run on a specially adapted line between Pre-Saint-Gervais and Porte des Lilas. Construction methods in the new system in many respects follow automobile technique rather than that of railroads. The conveyance, 15 meters long, is mounted on two bogies, each equipped with four pneumatic-tired bearing wheels and four horizontal pneumatic-tired guide wheels; the latter are arranged in pairs in front of and behind the bearing wheels. The wheels are designed to run on or (in the case of the horizontal wheels) against concrete surfaces so that all metal-to-metal contact is eliminated and noise is largely suppressed. A further advantage claimed for the system is that the superior adhesion of the pneumatic tires (three times greater on wood, iron, or concrete surfaces than that of metal wheels on rails) makes for improved braking and starting and leads to higher overall traveling speed.

Each bearing wheel is coupled with a safety wheel of steel similar to ordinary railroad wheels, but much lighter. The steel wheel does not touch the bottom when the pneumatic tires are normally inflated, but if a bearing or guide wheel is punctured, the safety wheel goes into action; at the same time a light goes up to warn the conductor of the puncture.

For the present the line employing the new system has been adapted for it by an arrangement of oak stringers along side the usual rails, but it is expected in the future to replace the road, with its rails, cross-ties, and ballast by a simple concrete track, which should permit a considerable reduction in the cost of upkeep. The demonstration car is provided with fluorescent light; openings on both sides, near the roof, insure proper ventilation; names of stations, adjoining streets and points of transfer, are announced by microphone.

The New Activator, Stanax I

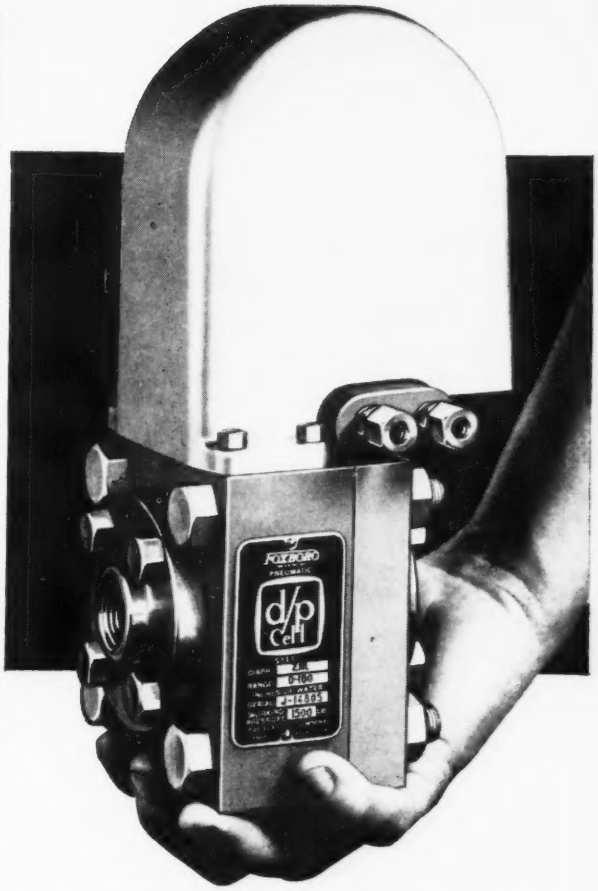
Stanax I is a new activator from Etablissements Doittau Produits Chimiques, for which some rather unusual qualities are claimed. In appearance it resembles a light-colored vaseline; it is readily incorporated in mixes and has a plasticizing effect; it speeds up and improves dispersion of fillers, especially in heavily loaded mixes; in fact Stanax I is claimed to have rather a remarkable effect on the latter kind of mixes, which show increased resistance to traction or abrasion, have more nerve, and vulcanize readily.

The new activator can be employed with mercoptobenzothiozole in proportions from 0.3 to 1.2 (of the Stanax) with 0.4 to 0.6 of the MBT, and is, in general, useful with all derivatives of the latter. In conjunction with MBT, Stanax reduces curing time, gives considerably increased modulus and resistance to rupture, improved elasticity, with decrease in permanent set, hysteresis and heat build-up; gives excellent platform type cure and very good aging, often better than that of MBT mixes, it is further claimed. In GR-S especially cold GR-S, the new activator yields better results than when DPG is employed. In certain cases Stanax I can replace a part of the MBT or MBT derivative.

For the French economy today, an additional advantage is that Stanax I is not prepared from aromatic intermediates, which are in short supply in France, so that the use of Stanax instead of D.P.G., for instance, releases more raw material for the manufacture of M.B.T.

Polyethylene Production to Be Undertaken

The S.A. Ethylene-Plastique, established in May, 1951, has acquired manufacturing rights for polyethylene from Imperial Chemical Industries Ltd. A factory is under construction at Mazingarbe (Pas-de-Calais), but it will probably be another year before production can be started. Initial output of 2,000 tons annually is looked for, with necessary ethylene to be supplied by Houilléres du Bassin du Nord et du Pas de Calais. This concern and Société Pechiney and Huiles, Goudrons, Dérivés, are the main stockholders in Ethylene Plastique.



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Compounding Ingredients in Latex Goods

Although the aging of articles manufactured direct from latex usually is excellent, G. Croux and S. Lenarchand[1] decided to investigate the part played by the sulfur content and by the nature of the accelerators used in the aging of such goods; at the same time the effect of the antioxidants was studied.

The tests to determine the effect of the sulfur content, conducted on samples from five mixes containing from 1% to 5% of sulfur, gave results similar to those obtained with corresponding solid rubber samples—that is, aging properties declined with increase in sulfur, but with this important difference: aging of the latex samples containing less than 3% of sulfur could still be termed excellent; deterioration was very much less than for similar samples prepared from solid rubber. Furthermore such latex mixes, unlike those from solid rubber, were little or not at all affected by the addition of antioxidants, suggesting that the protective action exercised by the natural antioxidants present in latex is not impaired by the treatment the material undergoes, and that addtion of artificial antioxidants is unnecessary and may even prove harmful in certain cases because of reaction with the natural protective agents.

The type of accelerator was found to be a very important factor. Certain products, like zinc diethyl dithiocarbamate, or derivatives of mercaptobenzothiazole, confer excellent properties, even in the absence of protective agents, probably because in these instances the natural antioxidants of the latex can play their parts. With other accelerators, as zinc isopropyl xanthate, aging is very bad, but considerable improvement results when a suitable protective agent is added. Similarly the addition of a combination of antioxidant (BLE) and deactivator (zinc mercaptobenzimidazolate) greatly improves compounds containing a mixture of tetramethylthiuram monosulfide and zinc mercaptobenzothiazolate.

The authors emphasize that protection of molded latex vulcanizates is much more complicated than of solid rubber, and that careful choice must be made of the most suitable accelerator, and where necessary, of the antioxidant or combination of antioxidant and deactivator. Above all, reasoning by analogy should be avoided, since a certain product which may have proved effective in a given mix, may turn out to be inactive or even harmful when used in another.

[1] *Rev. gén. caoutchouc*, 28, 12, 867 (1951).

Recent French Developments

To reduce fatigue of drivers traveling over long distances, a sponge-rubber filled cushion has been designed which can be used either to support the head or the small of the back.

A street-cleaning truck is equipped with a dirt-elevating device cosisting of a belt provided with rubber buckets.

What artists might call an abstraction of a chassis has been designed by a French sculptor (who is also a mechanic) for inexpensive automobiles. The structure consists of gracefully swirling hoops and loops of aluminum tubing, with weight and stress-bearing parts of slender steel bar and tubing. Rubber is used in several places as shock-absorbing material, as in the wheel mountings, and in sleeves for clothespin-type springs. The overall length of the car is 2.10 meters; the wheels are equipped with pneumatic tires 270 by 90 mm. (about 11 by 3½ inches), a speed of 80 kilometers per hour, or roughly 50 miles an hour is expected.

First Chemical Exhibition

For the first time the French chemical industry organized an exhibition of its own, held in Paris during November 22-December 2, 1951, when a comprehensive display was offered including factory equipment, laboratory apparatus and products. Many rubber and plastics manufacturers participated, showing a wide variety of corrosion-resistant linings, tubing, pumps, containers, parts, etc. Among the newest products featured was a synthetic resin based product, Keebush, said to be particularly suited for molded parts intended to be used under extra-severe conditions, as for instance, where concentrated and boiling hydrochloric acid is used. Another interesting plastic product was Lucoflex, a rigid polyvinyl chloride material said to be outstanding in regard to resistance to combustion and chemicals. It seems that Lucoflex has just been employed in the construction of a hydrolysis tower 23 meters high. The Institut Français du Caoutchouc, in collaboration with various companies, arranged an attractive stand featuring the apparatus and equipment required for a rubber testing laboratory.

Investigations on "Deactivators"

In 1943, J. Le Bras called attention to certain substances which, though having but little effect on the oxidizability of a compound, nevertheless provided excellent protection against aging; they apparently reduced the harmful action of the absorbed oxygen by deactivating peroxides as soon as they were formed. The first known "deactivator," as Le Bras termed it, was mercaptobenzimidazole.

Le Brass and collaborators later showed that aging could be markedly improved by using a "deactivator" in addition to an antioxidant, and further investigations indicated a connection between the presence of a mercapto group, —C—SH, and deactivating power.

In "Chemical Structure and Deactivation,"[1] J. Le Foll, of the I.F.C., describes results of investigations on a number of chemicals more or less related to the first deactivator, mercaptobenzimidazole, undertaken to determine the influence of chemical structure on deactivation and to confirm and complete the earlier results.

The substances examined come under five heads: thiourea and its N-substituted derivatives, thioacids, thioamides, derivatives of mercaptopyridine and of mercaptopyrimidine. To bring out clearly deactivating power of these materials and hence permit classification, use was made of a coefficient $D=\frac{O}{V}$, where O and V represent, respectively, oxidation and aging indices. The tests showed that the mercaptan function is sufficient to induce deactivating effect, but that the effect becomes important only when certain other functions are added. The choice of these other functions, however, is a delicate matter, since the end product must fulfill two apparently conflicting requirements: the mercaptan function must not be lost as a result of tautomerism, and the end-product must not have a strongly accelerating action.

His observations lead the author to conclude that the most suitable deactivators are five- or six-membered cyclic compounds in which the carbon carrying the mercaptan group is linked to two nitrogen atoms, or by one atom of nitrogen and one of oxygen, as is the case in mercaptobenzimidazole, mercaptopyrimidine, and mercaptobenzoxazole.

[1] *Rev. gén caoutchouc*, 29, 2 114 (1952).

GREAT BRITAIN

A Scottish correspondent in *India Rubber Journal*[1] reports that the Chemical Sub-Committee of the Scottish Council is studying prospects of manufacturing synthetic rubber in Scotland.

Because of seasonal reduction in the demand for tires affecting the entire industry, North British Rubber Co., Ltd. Edinburgh, decided to cut production and closed the tire factor for two weeks starting December 2, 1951.

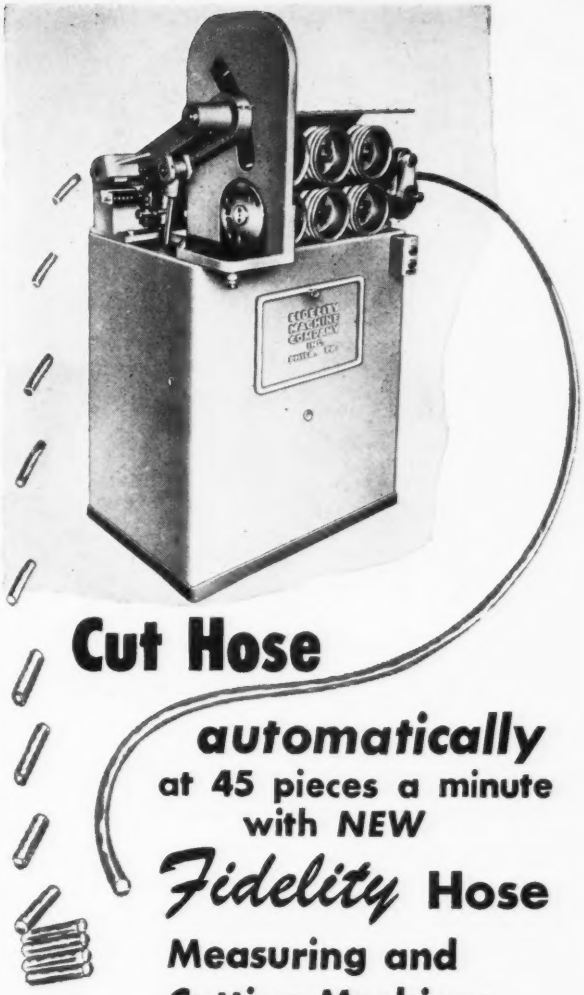
H. Eric Miller, chairman of the International Rubber Development Board, of Harrisons & Crosfield, and of many rubber plantation companies, is named in the New Year Honors List a among those to receive a knighthood. Mr. Miller is also chairman of the British Rubber Producers' Research Associatio and of the International Rubber Research Board.

A new company, Alsheath Ltd., London, has been form by British Insulated Callender's Cables to utilize its knowledge patents, and development work in the field of aluminum sheathe cables.

[1] Jan. 1, 1952, p. 3.

BELGIUM

S. A. Solvic, which began producing PVC in Belgium not long ago, reports increasing outputs of this material. Extensions under way are expected to permit production of about 300 tons a month starting this spring, as compared with eight tons a day at the beginning of the year, and 400 tons a month in 1953. Development work will make it possible by the end of 1952 to add mixed polymerizates in the form of resins, pastes, and latex to the existing list of five grades (including one latex) now prepared.



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SWEDEN

The Swedish Institution of Rubber Technology held its annual fall meeting in Stockholm on November 23 and 24, when Bo Sarno, vice chairman, was elected chairman to take the place of Frank Holmes, who has returned to the United States. Anders Rydin is the new vice chairman; Harris Hart, of Goodyear (Sweden), became a new member of the board. The other officers were reelected.

Mr. Holmes was appointed the Institution's first honorary member.

The meeting decided to cooperate closely with the Institution of the Rubber Industry on education and diplomas.

Altogether four papers were read:

"Standardization of Rubber, Aims and Progress," by J. M. Buist (I.C.I., Manchester, England).

"Mills, Calenders and Extruders," Mr. Froehlich (Herman Berstorff, Hanover, Germany).

"Frantex and Franvinyl, New Reinforcing Fillers," by R. A. Gauthier (Franterre, Paris, France).

"Light-Colored Reinforcing Fillers in Rubber Compounds," by Dr. Westling (Degussa, Frankfurt a.M., Germany).

Participants at the meeting were invited to see the works of the two largest cable factories in Sweden, Liljeholmen and Sieverts Cable Works, outside Stockholm.

FAR EAST

MALAYA

GSA Penal Clause Resented

The decision of the General Service Administration to enforce the rejection clause on deliveries of rubber below qualities contracted for created consternation and resentment here. Prices on the Singapore market, already tending downward since the beginning of February, dropped steeply at the news, reaching the lowest level since August, 1950. Emergency meetings were called by local rubber trading associations; strong protests were wired to London; many urged the removal of destinational control if the American attitude with removal to the penal clause did not change; and the Singapore Government felt impelled to consult with the British Government in the matter.

In an editorial dated February 19, the *Straits Times* showed that since the beginning of February the price of rubber had fallen more than 28 cents (Straits currency) a pound, representing a loss in Malaya's earnings of about $34,000,000 (Straits) a month, and a fall in export duty of $4,000,000 a month. It found the penal clause to be "vicious because the GSA is the sole American buyer," and talks about the "price hammering" policy of "American cartels." An unnamed Indonesian Government spokesman was quoted as saying that the GSA's action would bring the smallholders' production to a stop in a very short time. Again it was recalled that Malaya and Indonesia at some cost to themselves took action, in American interest to prevent Communist countries from stockpiling.

Gloomy predictions from London were also published; one editor was reported as having said that if the price of rubber went to 2s. 4d. a pound, many estates would have to close; thousands of laborers would be thrown out of work, becoming a source of "seething discontent" in a Communist-plagued area and thus give aid to the Reds.

Tension here was somewhat relieved when the announcement was received that the United States Government had freed rubber buying. The immediate reaction was optimistic, but was followed by an attitude of rather nervous watchful waiting for what would happen. The hope was expressed, however, that now something would be done to modify the resented penal clause.

The *Malay Mail* seemed more worried about the effects of a possible new boom here in a few months' time when the American market will be really free and local speculators become active again. In an editorial, February 26, it suggests the advisability of government control to "prevent prices rising to a perilous level."

"Most of the fluctuations in rubber price in the past twelve months," it continues, "have been due to unrestricted gambling

in the rubber market in Singapore, and it is due to these fluctuations that the GSA lost patience and complained of gouging. The speculators are a completely useless body of men, who give no service to the community whatever, and if their activities could be curbed, it would make for a more healthy economy in this country."

Declining Outputs and Rising Costs

The falling prices of crude rubber are focussing attention more sharply on costs of production. It is, of course, nothing new that the rubber planting industry is now faced with costs which bear no comparison with those in prewar days. But another factor is making itself felt—the decline in production which started in 1951 and continued at least through January, 1952; and it seems to be becoming commonplace to consider 2s. a pound as a fair average estimate of all state costs.

That no section of the Malayan rubber industry has escaped the downward trend in production is clearly indicated by the figures for comparative yields in pounds per tapped acre on estates of 100 acres and over, as given by the Secretariat of the Rubber Study Group:

	Ordinary		High-Yielding		"Weighted" Average	
	1950	1951	1950	1951	1950	1951
European	448	374	840	833	538	492
Chinese	392	312	781	671	447	373
Indian	367	283	548	673	390	330
Others	295	269	262	498	372	342
"Weighted" average	429	355	818	798	511	460

Similar data for smallholders are not available, but their 1951 yield per planted acre was 442 pounds, against 507 in 1950.

Output in January, 1952, again showed a decline, 51,065 tons, against 56,070 in January, 1951. Out of 1,747,255 acres of tappable rubber on estates of 100 acres and over, 1,571,384 acres, or 89.9%, were tapped in January, against 1,578,417 acres, or 90.2%, in December, 1951, although the area of tappable rubber rested under rotational system was slightly smaller in January than at the end of last year.

INDIA

Exports from India of rubber products other than footwear, toys, and sporting goods have been placed under control. No belting may go out of the country, and fixed quota will be introduced for tires and tubes. On the other hand exports up to 100% (of any year in the period 1948-1950)

Long Flex Life?
SEE PAGE 4

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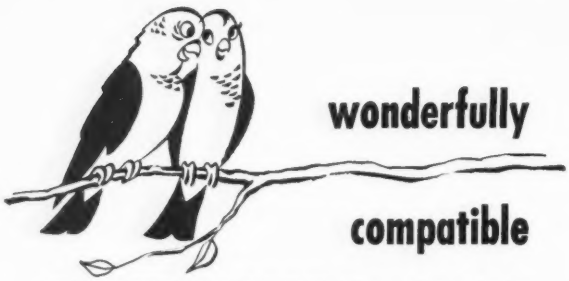

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will be allowed on rubber products for which foreign markets have been developed in recent years. It has been decided, furthermore, to permit exports up to 20% of production during the first or second half of 1951 on new products or to new markets.

Manufacturers of shoes will be permitted to import from the dollar area during any quarterly period rubber heels and soles to the extent of 10% of the value of shoes with rubber heels and soles which they exported in the preceding quarter.

Imperial Chemicals Industries, Ltd., has opened a new technical service laboratory at Tiljala, Calcutta, chiefly for the customers in the rubber and plastics manufacturing industries.

The Indian plastics industry now consumes about 4,000 tons of materials annually, including 1,000-1,500 tons of phenol-formaldehyde, 500 tons of urea, 500 tons of cellulose acetate, 100 tons of cellulose nitrate, 1,000 tons of polystyrene, and 500 tons of methacrylate. Some 10,000 persons are employed in the production of plastic goods, chiefly for household purposes.

Among the raw materials produced locally are furfural from rice hulls, corn cobs, and bagasse; oil from tobacco seed for use in alkyds; and phthalic anhydride. A company is to start the erection of formaldehyde and urea manufacturing installations. The National Chemical Laboratory is investigating the possibilities of obtaining phenol from the fluids in the shells of varous kinds of nuts.

INDONESIA

Recently an improved method of producing sole crepe in various bright colors, as orange, blue, green, yellow, as well as black and brown, has been developed at the I.N.I.R.O. (Indonesian Institute for Rubber Research) at Bogor, Java.[1] A dispersion consisting of 100 grams of organic coloring material and 200 milliliters of Acto 600 (a product of the Standard Vacuum Sales Co.) in 700 milliliters of water is mixed with freshly tapped latex, which is then diluted as usual to the proper concentration, and the whole is thoroughly stirred before normal coagulation with formic acid.

The preparation of colored sole crepe, it is pointed out, offers several advantages outside of the obvious one of providing attractive matching soles for colored footwear.

The standards followed in grading normal uncolored white crepe are strict so that not more than 60% of the dry rubber content of the latex collected ends up as first-quality crepe soles; of the remainder, about 18% has to be worked up as off-grade crepe, to be sold at markedly lower prices, and the other 22%, consisting of clippings, is remilled to lower grades of sole crepe.

The loss of time and money involved in the above procedure is avoided when colored crepe is made (more than offsetting the added cost of the pigment), since no part goes into the off-grade crepe; while the cuttings, when judiciously blended, yield highly attractive multicolor marbled sheets suitable for use as foxing for informal footwear. This material as well as the solid color sheets would also seem to offer other possibilities —as mats and table covers and the like.

[1] *Bergcultures*, 20, 22, 365 (1951).

CEYLON

The Low Country Products Association has reportedly warned the Ceylon Government of an impending grave crisis in the rubber industry and is said to be urging the government to pursue the possibilities of trade with all countries. It is rumored that the Association will also suggest that the government send a delegation to China to discover the possibilities of the barter of rubber for rice.

Further shipments of Ceylon rubber for Red China have recently been made. Toward the end of January, 450 tons were sent by the Polish freighter *Tobruk*, and about the middle of February the Russian freighter *Nicolaev* left Colombo with 1,850 tons of rubber for China. It appears that the Chinese paid a little above market prices for the last shipment.

Work was started in January on the first experimental section of rubberized roadway in Ceylon, consisting of a half-mile length of road 40 feet wide. The rubber powder used in combination with bitumen was obtained from Malaya. If the experiment proves successful, steps will be taken to manufacture rubber powder in Ceylon.

Output of rubber in Ceylon for 1951 came to 105,000 tons, against 113,500 tons the year before.

Editor's Book Table

BOOK REVIEWS

"Light Hydrocarbon Analysis." Edited by O. W. Burke, Jr., C. E. Starr, Jr., and F. D. Tuemmler. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 7 by 10 inches, 654 pages. Price, $15.

This book is essentially a compilation of specific analytical procedures compiled and tested for the Office of Rubber Reserve, RFC, by the Butadiene Committee on Specifications & Methods of Analysis. Also included are various schemes employing these methods for the complete analysis of highly complex hydrocarbon mixtures. In a new approach to the presentation of analytical procedures, the authors also include information on butadiene manufacturing processes as a background for the development of the methods, as well as extensive information on safe practices in the laboratory handling of light hydrocarbons, and statistical data on the accuracy and precision of the methods. This approach makes the book most useful as a working manual for industrial laboratories, as well as an instruction text for a course in advanced analytical chemistry. Much of the material has never been published before, including tables of data on the accuracy and precision of the test methods.

The book is divided into nine chapters, the first of which covers the history and function of the Butadiene Committee. The second and third chapters briefly describe the various butadiene production processes and the reasons for the specifications and test methods. Chapter 4 covers schemes of analysis for personnel not generally familiar with light hydrocarbon analysis; while Chapters 5 and 6 discuss sampling and handling and associated safety precautions. The compilation of analytical methods in Chapter 7 is presented in a form suitable for direct use, and the concluding two chapters are concerned with methods for preparing known mixtures of light hydrocarbons and the evaluation of the methods. The book, moreover, has a list of the Committee members and associates, an extensive appendix of tables of test data, and a subject index.

"The Firestone Story." Alfred Lief. Whittlesey House, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 444 pages. Price, $4.50.

This book presents an interesting and comprehensive history of the first 50 years of The Firestone Tire & Rubber Co. since its inception on August 3, 1900. More properly, the book is a history and tribute to the company's founder, Harvey S. Firestone, whose policies and efforts shaped the company's formative years and the stages of growth and expansion which followed. At the same time the author presents a fascinating review of business conditions and growth and the problems of a competitive economy during the first half of the Twentieth Century.

All aspects of the company's growth and development are described in detail in narrative form. Much of the story deals with the development of tires from the original solid internal-wire types to the present low-pressure models, and the effect of tires and highway transportation on the domestic economy and way of life. The different problems encountered with rim standardization, rubber quality, availability, and price considerations, sales and promotional techniques, labor and economic difficulties, and others are all described in relation to the overall view of tire development.

Other company activities are treated in detail in tracing the company's management, technical, productive, and sales growth and development. The story ranges from the beginnings in Akron to the Liberian rubber plantations and the present world-wide structure of the firm, with due attention paid to the development of employe relations programs, farm service work, and extensions into the field of banking, cotton fabrication, rim manufacture, dealer stores, and the manufacture of plastics, batteries, and other products.

"Communication of Technical Information." Robert M. Dederich. Chemonomics, Inc., 400 Madison Ave., New York 17, N. Y. Paper, 6 by 8½ inches, 118 pages. Price, $5. Written from the viewpoint of management, this booklet presents a logical and systematic treatment of the principles underlying the communication of information by professional men to non-technically trained persons. Stress is on the thinking and logic behind the communication of technical information, rather than on the grammar, spelling, and other mechanics of report writing.

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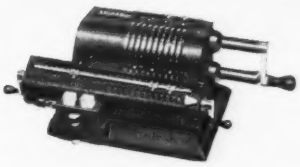

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NEW PUBLICATIONS

Publication of Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. **"Witco Stabilizer No. 80."** Technical Service Report S-6. 1 page. This report provides information on the properties and uses of a new vinyl stabilizer that consists of barium and cadmium soaps in combination with a synergistic stabilizer. The product is said to give excellent stability against both heat and light degradation.

"Witco Continex HAF High Abrasion Furnace Black in Natural and Chemical Rubbers." Bulletin 52-1. 88 pages. Extensive data in the form of tables and diagrams are given comparing the performances of Continex HAF and other competitive HAF blacks in natural, GR-S, low temperature, butyl, Hycar, and neoprene rubber compounds. Properties of the HAF blacks are discussed, with electron micrographs of the particles, and one section deals with rubber mixing and test procedures.

"Table of Dielectric Constants of Pure Liquids." National Bureau of Standards Circular 514. Arthur A. Maryott and Edgar R. Smith. 50 pages. For sale by the Superintendent of Documents United States Government Printing Office, Washington 25, D. C. Price 30c. This tabulation of the dielectric contants of pure liquids is in three sections, standard (reference) liquids, inorganic liquids, and organic liquids. The effect of temperature on dielectric constants is considered, together with the estimated accuracy of the tabulations, and literature references are cited for all data.

"New G-E Fractional Horsepower Motors." Bulletin GEA-5567. General Electric Co., Schenectady 5, N. Y. 16 pages. This illustrated bulletin describes a new line of "Form G" fractional horsepower motors that differ from conventional motors in that they are lighter in weight, smaller, and embody a special nylon insulation system. The motors are available in various styles and sizes to meet a wide range or requirements.

"Aranox, Antioxidant and Copper Inhibitor." Compounding Research Report No. 17. Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8 pages. Detailed information is given on the properties and uses of Aranox. Formulations and test data are tabulated to show its effect in white natural rubber stocks, air cured and sulfur chloride cured products, and neoprene products and fabric coatings.

"MP-1, Midwest Standard Premix for Molded Goods." Report No. 16. Midwest Rubber Reclaiming Co., East St. Louis, Ill. 4 pages. This report offers data on the composition, advantages, compounding, and properties of MP-1, a reclaim premix containing all or most of the fillers and softeners, except for curing agents, required for a complete stock. All the ingredients have been blended with and dispersed in the reclaim.

"The Chemical Resistance of Neoprene, Rubber, and Plastisol Coatings." Plastex Products Co., Marietta, Ga. 5 pages. This bulletin contains a detailed tabulation of the resistance of neoprene, rubber, and vinyl plastisol coatings to 92 chemicals. Resistance values are shown according to chemical concentration and temperature ranges.

"A Frog's-Eye View of Toscony Prints Made of Vinylite-Brand Plastic Film and Sheeting for 'Beauty Plus Quality'." Toscony Fabrics, Inc., New York 16, N. Y. 24 pages. This illustrated booklet presents an interesting account of the production of Vinylite film and sheeting and their transformation into Toscony fabrics by printing with vinyl resin-based inks. Advantages of the fabrics are given, together with suggestions for home sewing and descriptions of Toscony's merchandising, informative labeling, and export sales policies.

"Monsanto Chemicals for the Rubber Industry." Monsanto Chemical Co., 920 Brown St., Akron 11, O. 46 pages. The compositions, specifications, and applications of Monsanto accelerators, antioxidants, and special materials for rubber compounding are given in this bulletin. Tabular data on the amounts of accelerators to be used in various types of natural and synthetic rubber stocks also appear. Other sections present a table of solubilities for the different chemicals; methods of analysis; dispersions and emulsions for use with latices; chemical names of Monsanto products; and Monsanto chemicals in Great Britain

"Esters." Carbide & Carbon Chemicals Co., New York 17, N. Y. 40 pages. This bulletin gives the properties, uses, and shipping data of more than 30 esters sold by the company. Test methods are also discussed, and there is a selected bibliography of literature references on esters.

"Your Investment in Synthetic Rubber." Kentucky Synthetic Rubber Corp., Louisville 1, Ky. 14 pages. Background information on the company's operations in the manufacture and shipments of GR-S is provided by means of photographs and brief descriptions. A history of the firm also appears together with a discussion of its place in the synthetic rubber program.

"The Pangborn Type 'CM' Cloth Bag Dust Collector." Bulletin 914. Pangborn Corp., Hagerstown, Md. 8 pages. Information appears on the design, speeifications, installation, and maintenance of the company's new cloth bag dust collector for carbon black, cord, graphic, pigments, metal oxides, and similar dusts.

"Foam Plastisol." Interchemical Corp., New York, N. Y. 1 page. A description is given of a new plastisol formulation which can be foamed by the application of heat without pressure. Cellular structure and size may be controlled in the formulation of the material, and a range of colors is available.

"Long-Wearing Machinery Parts Made of 'Haynes' Alloys." Haynes Stellite Co., Kokomo, Ind. 24 pages. A wide variety of cast and wrought alloy parts being used in many industries to solve abrasion, corrosion, and high-temperature problems is described in this booklet. More than 60 drawings, tables, and photographs show some of the sizes and shapes of alloy parts being used.

"How the Navy Pays Its Bills." NAVSANDA Publication 258, January, 1952. United States Navy Department, Washington, D. C. 16 pages. **"Sound Health Action through Public Information."** Admiral W. H. P. Blancy, U.S.N. (Ret.). Health Information Foundation, 420 Lexington Ave., New York 17, N Y. 20 pages. **"Where to Buy.** A Directory" B. F. Goodrich Co., Akron, O. 20 pages.

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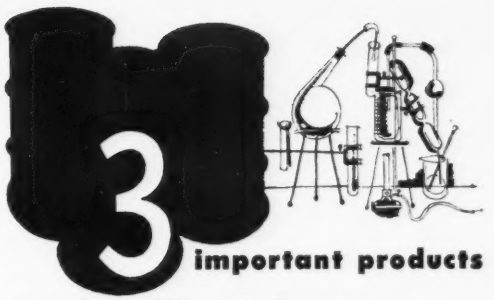

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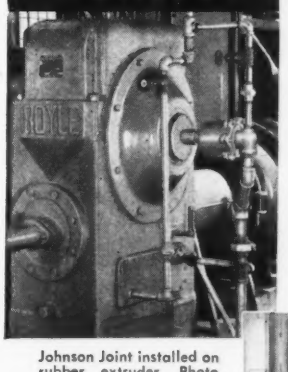

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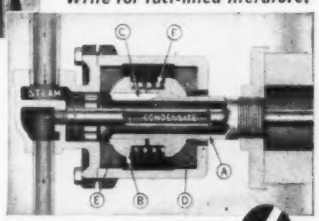

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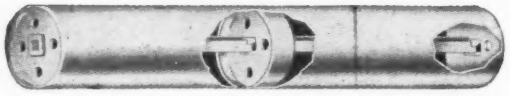

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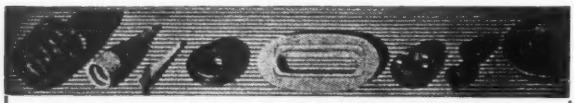

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Dust Collectors

(Continued from page 132)

Cut-Away View of New Pangborn Cloth-Bag Collector Showing Dust Removal Operation

air passes through the bags and leaves through an outlet at the top of the collector.

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MARKET REVIEWS

View of Commodity Exchange's Rubber "Ring" at Resumption of Rubber Futures Trading

CRUDE RUBBER

SEVERAL major developments took place in the crude rubber market during the period from February 16 to March 15. On February 23 the GSA ended its 14 months of exclusive government importing and supplying of natural rubber and announced plans for an "orderly transition" over the next four months from public to private purchasing of rubber. The NPA, however, will continue its controls over rubber consumption and inventories.

Under the announced program GSA will continue as sole supplier of crude rubber through May and will make up to 35,000 long tons of dry rubber available for consumption requirements in both April and May. Up to 20,000 tons will be available for consumption in June. Rubber dealers and manufacturers together will be permitted to import a maximum of 30,000 tons for arrival here during June. This total consists of quotas of 15,000 tons each for dealers and manufacturers and will come into this country under licenses from GSA.

The rubber manufacturing industry will be required to satisfy all its consumption needs for natural rubber after July 1 either through private sources or by purchases of government rubber made available under the stockpile rotation program. The announcement also permitted the immediate resumption of rubber futures trading on the Commodity Exchange, with September as the first delivery month. After a delay occasioned by mechanical difficulties, the Exchange resumed trading in rubber on March 3 for the first time since the original suspension on March 30, 1951. In ceremonies at the reopening, Exchange President Wm. Reid, Bache & Co., noted that rubber is the first of the basic commodities to be returned from government controls to the free market place.

Futures trading on the Exchange was limited to September, December, March, and May deliveries. Prices fluctuated irregularly during the first two weeks of March, and March 3 opening and March 14 closing prices for the four delivery months were as follows: September, 32.00¢ and 35.00¢; December, 30.50¢ and 33.25¢; March, 29.00¢ and 31.25¢; and May, 28.00¢ and 30.25¢. A total of 546 lots, or 5,460 tons of rubber, were traded during the two-week period.

At the beginning of March the GSA reiterated its intention to reject all off-grade natural rubber arriving here after mid-April. GSA Administrator Jess Larson said that the penalty and rejection clause of rubber contracts with overseas sellers will not be imposed on inferior rubber shipped against orders placed prior to January 23, but that continued shipments of such rubber could lead to rejection. Larson also stated that GSA will continue to buy natural rubber for the stockpile after private trading is resumed, but will try to up-grade the stockpile to build up a desirable proportion of high-grade rubber.

On March 8 the RFC announced a 3¢ reduction in the selling price for GR-S to 23¢ a pound. A complete list of the revised GR-S prices is given elsewhere in the market section of this issue. The new price is calculated to permit the RFC to break even on its programmed production for the remainder of this year, and no further GR-S price reductions are expected for some time. The reduction was made possible by the recently increased expansion of petroleum butadiene production, and about 595,000 tons of the current 800,000-ton annual output of GR-S are now made from petroleum butadiene. The 26¢ a pound selling price for GR-S announced last September was based on a planned total production of 860,000 tons per year. Use of less higher priced alcohol butadiene than originally planned, and over-estimates of costs of both alcohol and petroleum butadienes contributed to the current price reduction.

On March 15 the GSA announced a reduction of 2¢ a pound, to 48.5¢, of its selling price for natural rubber for April and May deliveries. The reduction came as a surpise to the industry which had expected a cut of as much as 10¢ a pound owing to recent sharp declines in the foreign rubber markets. A further reduction in its selling price, and possibly an even more substantial one, is expected to be made by GSA for June deliveries, but will probably not be announced before mid-May.

Latices

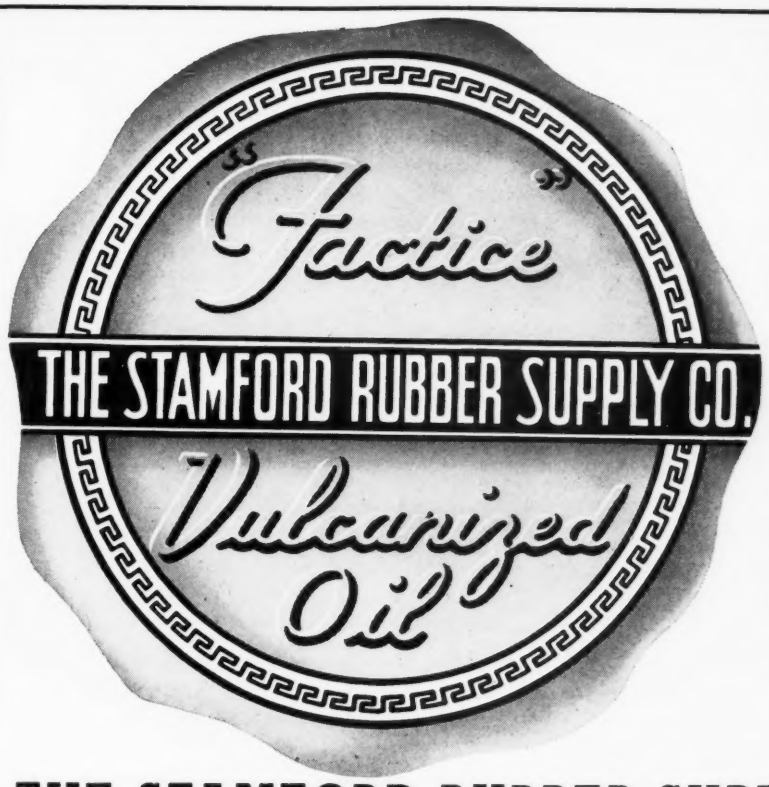
GOVERNMENT stocks of *Hevea* latex will probably be disposed of by May 1, and "free" latex is expected to be released for consumption between April 15 and May 15, according to Arthur Nolan, Latex & Rubber, Inc., in the March issue of *Natural Rubber News*. GSA is reviewing applications by recognized latex importers for permission to import latex, and such permission is being granted only when the importer certifies that the latex will not be consumed or sold for ultimate consumption until GSA announces the disposal of all government owned stocks.

Despite the reduction in the GSA selling price for dry natural rubber for April and May deliveries, no corresponding reduction in the *Hevea* latex selling price has been announced at this writing. Although the latex price has been based on a fixed differential over the dry rubber price in the past, there is some expectation that GSA will continue the February-March selling price of 62.5¢ a pound, solids content, for *Hevea* latex during April and May in order to assure orderly and prompt liquidation of its stocks. On the other hand, concentrated latex in bulk for June delivery in the United States has been quoted at 45-50¢ a pound, solids content, in the "free market."

Estimated January statistics for *Hevea* latex show imports of 1,500 long tons, dry weight; consumption, 4,200 long tons; and month-end stocks, 4,000 long tons. January estimates for GR-S latex follow: production 2,900 long tons, dry weight; imports, 100 long tons; consumption, 3,000 long tons; and month-end stocks, 3,500 long tons. Current prices for GR-S latices, embodying the recent reductions announced by GSA, are listed elsewhere in this section.

RFC Synthetic Rubber

IN A memorandum to all rubber purchasers, under the date of March 12, 1952, S. D. Morgan, chief, sales branch, Synthetic Rubber Division, Reconstruction Finance Corp., announced an average price reduction of 3¢ a pound for GR-S synthetic rubbers, effective with shipments of March 8, 1952. It was explained that, in general, the various types of polymers,



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Latex and Latex Compounds

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including latices, have been priced in accordance with their respective production costs.

The previous selling price of 26¢ a pound was established to assure a break-even operation on the basis of an annual production of 860,000 long tons of GR-S by June, 1952, of which about 31% was to have been produced from alcohol butadiene. The price reduction has been made possible by the expanded production of GR-S and a decrease in the required use of high-cost alcohol butadiene, it was said. All plants in the government program have been reactivated, and facilities for producing synthetic rubber from low-cost petroleum butadiene are being operated to capacity.

The selling prices of masterbatch polymers will continue to be based on the contained quantity of polymer, plus the contained quanity of either carbon black or oil, or both, plus a processing charge. The processing charge will be ½¢ a pound in the case of black and oil masterbatches, and 1¢ a pound in the case of oil-black masterbatches.

A complete list of all selling prices for RFC synthetic rubbers and latices, effective with shipments of March 8, 1952, follows:

(All Prices Provisional)

Hot GR-S Non-Pigmented

Types		Price per Pound (¢)
Staining		
AC		23
10		23.25
10 AC		23.25
20		23
20 AC		23
60	(Cross-linked)	23.25
60 SP	(Cross-linked)	23.50
65		23
65 SP		23.25
86		23
X-278 SP		24
X-489		23.25
X-603		23
X-627 SP		23.25
X-630		23
X-655		23.25
X-671		23
X-694		23
Slightly Staining		
18		23.25
X-274		23.25
X-491		23.50
X-631		23
Non-Staining		
25		23
26		23
40 AC		23
61 SP	(Cross-linked)	23.50
62	(Cross-linked)	23.25
66 SP		23.25
X-549 SP	(Cross-linked)	23.50
X-567		23
X-644		23
X-645		23.25
X-674 SP		23.50
X-675	(Cross-linked)	23.25
X-685		23
X-702 SP	(Cross-linked)	23.50
X-703 SP		23.25
X-704 SP	(Cross-linked)	23.50

Hot GR-S-Black Masterbatches

Staining		
B-1	100 GR-S/50 EPC Black	18.25
B-4	100 GR-S/50 EPC Black	18.25
X-360	100 GR-S/52 HMF Black	17.50
X-579	100 GR-S/55 Philblack A	17.50
Slightly Staining		
X-419	100 GR-S/50 Philblack A	17.75
X-433	100 GR-S/60 Pelletex	16.25

Cold GR-S Non-Pigmented

Staining		
100		23
101		23
X-600		23
X-601		23
X-601 SP		23.25
X-624		23
X-647		23
X-670		23
X-672		23
X-689		23
Slightly Staining		
X-637		23
Non-Staining		
X-565		23
X-620		23
X-625		23
X-565 SP		23.25
X-620 SP		23.25
X-697 SP		23.25

Cold GR-S Black Masterbatches

Staining		
X-580	100 GR-S/55 Philblack O	18
X-581	100 GR-S/55 Aromex	18
X-582	100 GR-S/55 Vulcan 3	18
X-598	100 GR-S/50 Philblack O	18.25
X-607	100 GR-S/50 Aromex	18.25
X-608	100 GR-S/50 Vulcan 3	18.25
X-609	100 GR-S/50 Kosmos 60	18.25
X-616	100 GR-S/50 Statex R	18.25
X-677	100 GR-S/55 Philblack O	18
X-688	100 GR-S/50 Continex	18.25

Cold GR-S-Oil Masterbatches

Staining		
X-628	100 GR-S/25 Circosol 2XH	19.25
X-654	100 GR-S/25 Shell SP X-97	19.25
X-660	100 GR-S/25 Circosol 2XH	19.25
X-663	100 GR-S/25 Dutrex-20	19.25
X-690	100 GR-S/60 Dutrex-20	15.75
X-692	100 GR-S/40 Circosol 2XH	17.50
X-696	100 GR-S/25 Sundex-53	19.25
Slightly Staining		
X-699	100 GR-S/25 Sundex-53	19.25
Non-Staining		
X-682	100 GR-S/40 Circosol 2XH	17.50
X-693	100 GR-S/25 Circosol 2XH	19.25

Cold GR-S-Oil-Black Masterbatches

Staining		
X-629	100 GR-S/25 Circosol 2XH/50 Philblack O	16.50
X-668	100 GR-S/25 Dutrex-20/62.5 Philblack O	16
X-669	100 GR-S/25 Dutrex 20/62.5 Philblack O	16
X-686	100 GR-S/25 Circosol 2XH/50 Aromex	16.50
X-691	100 GR-S/40 Circosol 2XH/77 Philblack O	14.75

Residue

Refined GR-S Residue Non-Pigmented	16
Unrefined GR-S Residue Non-Pigmented	
Approximate moisture content	
Not exceeding 10%	9
Between 10 and 20%	7.5
Over 20%	6
Refined GR-S Residue Pigmented	12.75
Unrefined GR-S Residue Pigmented	
Approximate Moisture Content	
Not exceeding 10%	6
Between 10 and 20%	5
Over 20%	4

Latices

Tank-Car Quantities, (10,000 Gal.)

Hot Latices		
2		21.50
3		21.50
4		21.50
5		25
6		25
8		25
X-381		21.50
X-446		23.50
X-523		21.50
X-653		25
X-664		21.50
X-695		21.50
Cold Latices		
X-547		24.50
X-617		22.50
X-619		26
X-633		24.50
X-667		26
X-683		24.50
X-684		26

GR-I

Types	Price per Pound (¢)
GR-I	20.75
GR-I-15	20.75
GR-I-15 CC*	20.75
GR-I 16	20.75
GR-I 17	20.75
GR-I 17 CC*	20.75
GR-I 18	20.75
GR-I 18 CC*	20.75
GR-I-R-21	20.75
GR-I 25	20.75
GR-I 40	20.75
GR-I-Y-107 (A)	20.75
GR-I-Y-108 (A)	20.75

(A) Standard reference lots.
* "CC" indicates packed in coated cartons.

SCRAP RUBBER

TRADING in scrap rubber was almost completely at a standstill during the period from February 16 to March 15. The little business done was confined to tires, and demand for tube scrap was non-existent. Scrap prices fell again, and further reductions are believed probable, although most prices were nominal in view of the absence of any sales. Export business was also dull since most purchasers are out of the market owing to lack of dollar exchange.

OPS ceilings for scrap rubber were given in our September issue, page 756. Following are dealers' actual selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$16.00	$17.00
S. A. G. auto tires	Nom.	Nom.
Truck tires	Nom.	18.00
2	Nom.	28.00
3	Nom.	25.00
	(¢ per Lb.)	
Auto tubes, mixed	3.5	3.5
Black	5.0	5.0
Red	7.5	7.5
Butyl	4.0	4.0

RECLAIMED RUBBER

THE reclaimed rubber market picture showed some improvement over that of the preceding month during the period from February 16 to March 15. February business was about 20% below the January level, but indications during the first half of March were for a good month of business. The future outlook for reclaim is somewhat uncertain, pending the actual resumption of private buying of crude rubber in September. Present indications are the flat bark crepe will be available at very low prices at that time, and some effect on reclaim demand is considered inevitable.

The reduction in the selling price of GR-S to 23¢ a pound resulted in lower inner tube reclaim prices at the end of the market period. Red tube reclaim was cut from 24.25 to 22¢ a pound; black tube reclaim from 20 to 16¢ a pound; and butyl tube reclaim from 14.5 to 13.5¢ a pound. The previous tube reclaim prices were at ceiling levels, and other reclaims continued generally at the levels set forth in CPR 58 (see our September issue, page 756).

Final December and yearly totals for 1951, and preliminary figures for January on the domestic reclaimed rubber industry are now available. Final December statistics give a production of 23,677 long tons; imports, 15 long tons; consumption, 22,044 long tons; exports,

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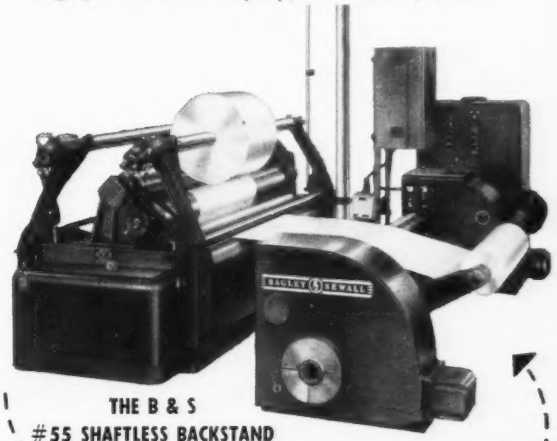

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1,024 long tons; and month-end stocks, 45,082 long tons. Yearly totals for 1951 follow: production, 365,933 long tons; imports, 767 long tons; consumption, 346,121 long tons; exports, 14,722 long tons; and year-end stocks, 45,082 long tons. Preliminary figures for January show a production of 27,942 long tons; consumption, 26,996 long tons; exports, 958 long tons; and month-end stocks, 46,198 long tons.

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COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Dec. 29	Jan. 26	Feb. 23	Mar. 1	Mar. 8	Mar. 15
May	41.76	41.66	39.99	39.99	39.58	40.47
July	41.20	41.28	39.28	39.15	38.60	39.43
Oct.	38.85	38.82	36.63	36.47	35.88	36.43
Dec.	38.30	38.49	36.48	36.23	35.66	36.22
Mar.	38.18	38.35	36.38	36.12	35.54	36.03
May	38.05	38.15	36.23	35.93	35.37	35.91

PRICES moved upward on the New York Cotton Exchange during the period from February 16 to March 15 as the result of short covering and price fixing by traders. Despite the continued lull in the gray goods market, observers expect the cotton market to show a firmer undertone on the basis of favorable export predictions and the expectation of a tightening supply of good grades of spot cotton later in the season. It was pointed out that only a small percentage of the relatively small crop carry-over at the end of this season will be of good cotton, and the better grades are already difficult to obtain.

The spot price for 15/16-inch middling cotton opened the period at 40.70¢ a pound, dropped back to a low of 40.50¢ on February 18, then rose irregularly to end the period at a high of 41.75¢. Futures prices showed corresponding gains, with the nearby months rising sharply.

Fabrics

Demand for industrial cotton goods was limited and spotty during the period from February 16 to March 15. Hose and belting ducks and chafer fabrics sold through April, but practically all other fabric constructions were inactive. Prices for many goods eased off again early in March, but the lower prices did little or nothing to stimulate business. At least one large producer of print cloths officially withdrew from the market, and there were reports of marked curtailments by other large producers.

Cotton Fabrics

Drills			
58-inch 1.85-yd.	*yd.*	$0.37	/ $0.375
2.25-yd.		.32	/ .33
Ducks			
38-inch 1.78-yd S. F.	*yd.*	.4275	
2.00-yd. D. F.		.39	
51.5-inch, 1.35-yd, S. F.		.5625	
Hose and belting		.80	
Osnaburgs			
40-inch 2.11-yd.	*yd.*	$0.27	
3.65-yd.		.17	
Raincoat Fabrics			
Print cloth, 38½-inch, 64-60	yd.	.145	
Sheeting, 48-inch, 4-17-yd		.225	/ $0.2275
52-inch 3.85-yd.		.25	
Chafer Fabrics			
14-oz./sq. yd. Pl.	*lb.*	.84	/ .85
11.65-oz./sq. yd. S.		.76	
10.80-oz./sq. yd. S.		.78	/ .80
8.9-oz./sq. yd. S.		.815	
Other Fabrics			
Headlining, 68-inch 1.35-yd., 2-ply	yd.	nom.	
64-inch, 1.25-yd. 2-ply		.69	
Sateens, 53-inch 1.32-yd.		.64	
58-inch 1.21-yd.		.69	
Tire Cords			
K. P. std., 12-3-3	*lb.*	nom.	
12-4-2		.90	

RAYON

DOMESTIC production of viscose high-tenacity tire-type yarn continued at top capacity during January and February. Total shipments to domestic consumers amounted to 32,300,000 pounds in January and 30,700,000 pounds in February. Total shipments of all types of rayon by domestic producers were 91,300,000 pounds in January and 82,200,000 pounds in February. While month-end stocks of rayon held by producers continued to increase, stocks of viscose high-tenacity yarn on February 28 were only 2,300,000 pounds, or approximately a two days' supply.

With no changes in rayon tire yarn and fabric demand or production taking place, prices were unchanged during the period from February 16 to March 15, as follows:

Rayon Prices

Tire Fabrics		
1100/490/2		$0.72
1650/980/2	$0.695	/ .73
2200/980/2		.685
Tire Yarns		
1100/480	.62	/ .63
1100/490		.62
1150/490		.62
1650/720	.61	/ .62
1650/980		.61
1900/980		.61
2200/960		.31
200/980		.60
400/2934		.66

United States Rubber Statistics — December and Yearly Totals, 1951

(All Figures in Long Tons, Dry Weight)

	December						Yearly Totals					
	New Supply			Distribution		Month-End Stocks	New Supply			Distribution		Year-End Stocks
	Production	Imports	Total	Consumption	Exports		Production	Imports	Total	Consumption	Exports	
Natural rubber total	0	44,333	44,333	30,149	25	71,817	0	677,962	677,962	407,265	2,603	71,817
Latex, total	0	860	860	3,107	0	4,752	0	54,963	54,963	46,750	0	4,752
Rubber and latex, total	0	45,193	45,193	33,256	25	76,569	0	732,925	732,925	454,015	2,603	76,569
Synthetic rubbers, total	*71,104 †3,854	897	77,855	60,421	1,419	129,420	*768,684 †76,471	10,085	855,240	758,897	9,249	129,420
GR-S types‡	*63,204 †2	709	63,915	49,757	18	105,271	*694,579 †2,231	7,715	704,525	626,444	483	105,271
Butyl	*7,900	188	8,088	5,952	0	12,48[1]	*74,105	2,370	76,475	70,500	216	12,48[1]
Neoprene‡	†4,717	0	4,717	3,753	1,151	8,379	†58,907	0	58,907	48,887	6,825	8,379
Nitrile types‡	†1,135	0	1,135	959	250	3,289	†15,333	0	15,333	13,066	1,725	3,289
Natural rubber and latex, and synthetic rubbers, total	76,958	46,090	123,048	93,677	1,444	205,989	845,155	743,010	1,588,165	1,212,912	11,852	205,989
Reclaimed rubber, total	23,677	15	23,692	22,044	1,024	45,082	365,933	767	366,700	346,121	14,722	45,082
GRAND TOTALS	100,635	46,105	146,740	115,721	2,468	251,071	1,211,088	743,777	1,954,865	1,559,033	26,574	251,071

* Government plant production.
† Private plant production.
‡ Includes latices.
SOURCE: Rubber Division, NPA, United States Department of Commerce, Washington, D. C.

VULCANIZED VEGETABLE OILS

—RUBBER SUBSTITUTES—

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

A LONG ESTABLISHED AND PROVEN PRODUCT

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CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

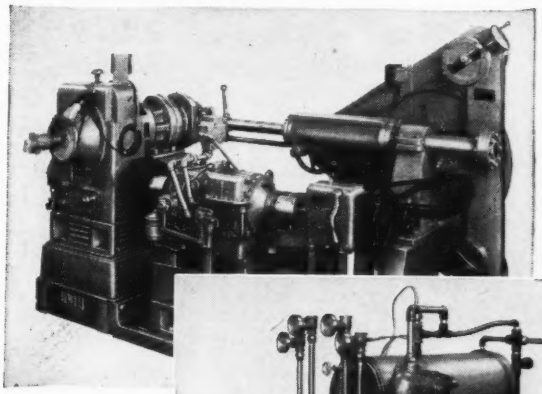
Represented by:
HARWICK STANDARD CHEMICAL CO.
Akron — Boston — Trenton — Chicago — Denver — Los Angeles

Of Particular Importance

To the Wire Insulating Industry

The room temperature compound process and associated equipment recently developed by the Western Electric Company, Incorporated, offer nine important advantages. These advantages begin with the storage of completely mixed, ready-to-extrude, rubber, GR-S, or Neoprene compounds and extend to a smoother and improved appearance for the finished product.

The complete extruder vulcanizing portion of the room temperature compound process is available to insulated wire producers* from John Royle and Sons who, for seventy-two years, have been building extruding machines to meet the most exacting process requirements.



↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

CHECK THESE ADVANTAGES:

- Improved diameter control
- Reduction in compound scrap
- Reduction in electrical faults
- Permits storage of completely mixed compounds
- Permits more economical scheduling of mixing equipment
- Eliminates "warm-up" operation
- Possible mill-room economies
- "Hot" machines may be converted
- Finished product has smoother finish—better appearance

Licensees of Western Electric Company

JOHN ROYLE & SONS
10 ESSEX STREET, PATERSON 3, NEW JERSEY

U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	November, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	122,419,311	$51,161,914
Latex	5,867,869	3,251,833
Guayule	240,400	75,370
Crude chicle	488,683	374,580
Balata	330,879	123,442
Jelutong or Pontianak	373,102	270,242
Gutta percha	73,501	26,011
Synthetic rubber	1,599,958	425,334
Reclaimed rubber	133,700	11,656
Scrap rubber	2,450,720	153,787
TOTALS	133,978,123	$55,874,169
MANUFACTURED		
Tires and casings		
Auto, etc. *no.*	3,482	$116,161
Bicycle *no.*	3,750	4,006
Other *no.*	81	854
Inner tubes: auto, etc. *no.*	467	1,065
Rubber footwear		
Boots *prs.*	1,731	4,920
Shoes and overshoes *prs.*	41,996	85,844
Rubber-soled canvas shoes *prs.*	358	608
Athletic balls: golf *no.*	11,376	3,427
Tennis *no.*	720	127
Other *no.*	67,350	9,010
Rubber toys, except balloons	.....	25,309
Hard rubber goods		
Combs *gr.*	10,092	876
Other	.....	88,755
Rubber and cotton packing *lbs.*	1,572	2,414
Rubberized printing blankets *lbs.*	266	653
Rubber gaskets and valve packing	.....	1,280
Molded insulators	.....	2,878
Belting *lbs.*	13,297	14,397
Hose and tubing	.....	33,252
Drug sundries	.....	11,673
Instruments *doz.*	1,384	4,031
Heels and soles *lbs.*	1,203	1,115
Bands *lbs.*	1,686	1,287
Other rubber products	.....	121
Gutta percha manufactures *lbs.*	537	519
Synthetic rubber products	.....	214
Other soft rubber manufactures	.....	102,844
TOTALS	.....	$517,640
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$56,391,809

Exports of Domestic Merchandise

	November, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	389,520	$169,751
Synthetic rubbers		
GR-S type	214,659	66,526
Neoprene	1,811,760	751,778
Nitrile type	570,701	304,457
"Thiokol"	700	337
Polyisobutylene	54,280	24,042
Other, except butyl	13,184	7,335
Reclaimed rubber	2,203,821	214,059
Scrap rubber	3,587,692	175,217
TOTALS	8,846,317	$1,713,502
MANUFACTURED		
Rubber cement *gals.*	46,894	$92,681
Rubberized fabric		
Auto cloth *sq. yds.*	25,299	31,379
Piece goods and hospital sheeting *sq. yds.*	86,169	77,496
Rubber footwear		
Boots *prs.*	13,234	66,998
Shoes *prs.*	7,305	12,957
Rubber-soled canvas shoes *prs.*	23,790	86,740
Soles *doz. prs.*	11,364	39,613
Heels *doz. prs.*	41,727	46,386
Soling and toplift sheets *lbs.*	838,070	158,835
Gloves and mittens *doz. prs.*	13,302	67,069
Drug sundries		
Water bottles and fountain syringes *no.*	17,252	12,641
Other	.....	186,511
And rubberized clothing	.....	107,070
Toy and novelty balloons	.....	42,877
Toys and balls	.....	37,731
Erasers, except pencil *lbs.*	25,804	21,102
Hard rubber goods		
Battery boxes *no.*	27,527	49,947
Other, electrical *lbs.*	94,992	80,614
Combs, finished *doz.*	8,601	8,316
Other	.....	21,889
Tires and casings		
Truck and bus *no.*	101,536	$5,268,674
Auto *no.*	59,295	936,238
Aircraft *no.*	.....	135,874
Farm tractor, etc. *no.*	6,203	286,327
Other off-the-road *no.*	10,273	1,489,805
Bicycle *no.*	3,726	6,164
Motorcycle *no.*	134	1,243
Other *no.*	5,216	46,909
Inner tubes: auto *no.*	39,733	91,008
Truck and bus *no.*	81,627	364,901
Aircraft *no.*	1,933	13,943
Other *no.*	11,308	57,929
Solid tires: truck and industrial *no.*	1,329	40,886
Tire repair materials		
Camelback *lbs.*	425,169	149,810
Other *lbs.*	317,788	305,398
Rubber and friction tape *lbs.*	64,452	54,630
Belting		
Auto and home *lbs.*	117,746	163,530
Transmission		
V-belts *lbs.*	173,866	382,641
Flat belts *lbs.*	65,113	104,265
Other *lbs.*	39,294	50,278
Conveyer and levitator *lbs.*	196,323	211,812
Other *lbs.*	6,865	4,419
Hose and tubing *lbs.*	817,720	768,709
Packing *lbs.*	222,562	228,968
Mats, flooring, tiling *lbs.*	422,215	124,908
Thread: bare *lbs.*	3,969	7,432
Textile covered *lbs.*	10,362	29,359
Gutta percha manufactures *lbs.*	7,368	6,444
Compounded latex and other rubber for further manufacture *lbs.*	319,985	175,556
Other natural and synthetic rubber manufactures	.....	600,443
TOTALS	.....	$13,357,355
GRAND TOTALS, EXPORTS	.....	$15,070,857

Reexports of Foreign Merchandise

	November, 1951 Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	149,117	$96,521
Balata	7,138	4,722
GR-S type of synthetic rubber	5,679	3,152
TOTALS	161,934	$104,395
MANUFACTURED		
Rubber drug sundries, except water bottles and syringes	.....	$145
Toys and balls	.....	4,192
Erasers, except pencil *lbs.*	610	196
Tires and casings		
Truck and bus *no.*	2	104
Farm tractor *no.*	38	1,228
Bicycle *no.*	120	156
Inner tubes *no.*	11	129
TOTALS	.....	$6,150
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$110,554

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Compounding Ingredients—Price Changes and Additions

Accelerator-Activators, Organic

Emersol 210 Elaine *lb.*	$0.1075	/ $0.1375
Emery 600 *lb.*	.09	/ .12

Carbon Blacks

Super Abrasion Furnace — SAF

Statex 125 Beads *lb.*	.125	/ .17

Latex Compounding Ingredients

Aquablaks *lb.*	.08	/ .1775

Plasticizers and Softeners

Baker AA Oil *lb.*	.3175	/ .3775
Crystal O Oil *lb.*	.3325	/ .3925
Processed oils *lb.*	.3375	/ .3725

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, January, 1952; December, January 1951

	January, 1952	% of Change from Preceding Month	December, 1951	January, 1951
Passenger Casings				
Shipments				
Original equipment	1,659,754		1,438,453	2,592,541
Replacement	3,392,875		1,803,649	3,061,918
Export	50,791		67,295	52,554
TOTAL	5,109,420	+54.39	3,309,397	5,707,013
Production	6,265,423	+28.50	4,875,982	5,433,309
Inventory end of month	8,069,652	+15.66	6,976,792	2,748,482
Truck and Bus Casings				
Shipments				
Original equipment	480,245		361,342	442,705
Replacement	849,980		715,900	749,986
Export	89,378		130,955	61,786
TOTAL	1,419,603	+17.50	1,208,197	1,254,477
Production	1,606,269	+ 4.07	1,543,384	1,330,639
Inventory end of month	1,969,118	+ 9.61	1,796,442	803,384
Total Automotive Casings				
Shipments				
Original equipment	2,139,999		1,799,795	3,035,246
Replacement	4,242,855		2,519,549	3,811,904
Export	146,169		198,250	114,340
TOTAL	6,529,023	+44.52	4,517,594	6,961,490
Production	7,871,692	+22.62	6,419,366	6,763,948
Inventory end of month	10,038,770	+14.42	8,773,234	3,551,866
Passenger (Including Motorcycle) and Truck and Bus Tubes				
Shipments				
Original equipment	2,143,822		1,802,955	3,042,337
Replacement	3,213,198		1,636,863	3,491,011
Export	99,257		123,205	69,628
TOTAL	5,456,277	+53.14	3,563,023	6,602,976
Production	5,548,923	+ 7.77	5,148,858	5,957,655
Inventory end of month	10,281,773	+ 1.64	10,115,742	5,868,335

SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

GENERAL LATEX
and
CHEMICAL CORPORATION

Importers and Compounders
Natural and Synthetic

RUBBER LATEX

VULTEX ®

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for every purpose
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Mechanical Specialties of Every Description
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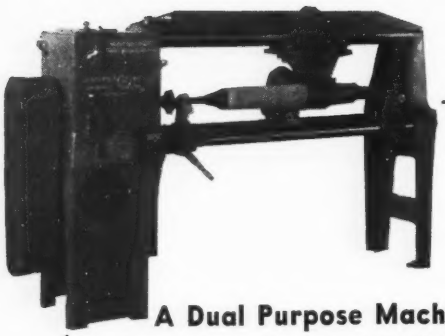

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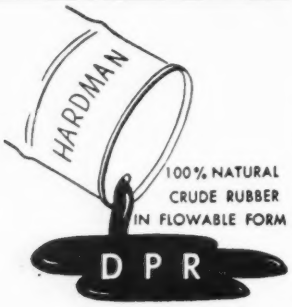

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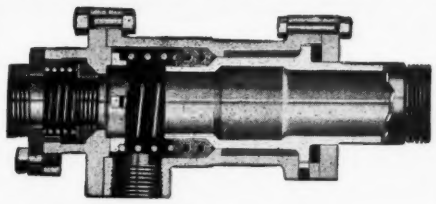

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RUBBER CHEMIST: THREE TO FIVE YEARS' LABORATORY or factory experience sole and heel industry or mechanical goods. Send complete résumé. Salary open. Our employes know of this ad. Address Box No. 1002, care of INDIA RUBBER WORLD.

FOAM RUBBER PLANT ENGINEER

with knowledge of compounding foam rubber cushions for upholstering trade. Capable of organizing and supervising a complete manufacturing operation. Attractive starting salary and profit sharing arrangement. No investment necessary. Plant located in or near Trenton, N. J. Write giving complete details of background and experience. All replies held in strictest confidence. Write to Mr. George Mallis, Ernest William Greenfield, Inc., 1518 Walnut St., Phila. 2, Pa.

WANTED: GRADUATE CHEMIST OR CHEMICAL ENGINEER with approximately 5 years' experience in the rubber industry. Excellent opportunity for a man with initiative with a modern and progressive concern in the East. Salary commensurate with experience. Submit photo if available, expected salary, and résumé. Replies confidential. Address Box No. 1003, care of INDIA RUBBER WORLD.

NEED EXPERIENCED RUBBER MAN FAMILIAR WITH ALL phases of rubber roll covering for paper mills, etc. Write giving education, experience, salary expected. Address Box No. 1004, care of INDIA RUBBER WORLD.

FOAM RUBBER—

Complete Personnel Required—
—Compound men
—Mechanical men
—Control chemists

Must have recent experience on mechanical unit using Oak continuous mixers. State age, experience, starting salary. We are a new concern in foam rubber and your replies will be treated confidential.

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ADHESIVE CHEMIST—EXPERIENCED CHEMIST WANTED BY midwest rubber company to formulate and develop pressure-sensitive adhesives of all types. Good opportunity. Give complete résumé on education, experience, references and salary requirements. Address Box No. 1005, care of INDIA RUBBER WORLD.

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RELIABLE CHEMIST, B.S., TO ASSIST A BUSY CHIEF CHEMist, who wants to rely on an experienced and adaptable assistant in the development of adhesive problems. Pressure-sensitive adhesives, tapes, laminating cements, adhesives from any rubber, from polymers, from vinylites, from cellulose lacquers, from resins. Coatings of diverse types, quarterlings, emulsions. Factory and laboratory experience. Practical minded. Salary according to responsibilities. Present salary $400 per month. Address Box No. 998, care of INDIA RUBBER WORLD.

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